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EXPLANATION OF THE SUPPORT OF A SPHERICAL BODY ON A JET OF WATER.

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Believing the effect to depend on the mutual adhesion of the water and ball, and on the rotation of the latter, I performed the following experiments for the purpose of testing this hypothesis:

A ball of cork was covered with a thin coat of tallow: the coating diminished the adhesion of the water, and rendered the support of the ball more transient and precarious. The ball was sustained, though for a less time, and water was found to adhere to it, though with diminished force. Similar results were obtained by covering it with a thin lamina of beeswax. In both cases a diminution of the adhesive force was followed by a corresponding diminution of the average duration of support.

The next experiment in relation to this point was still more conclusive, and established the truth of my hypothesis, that the adhesion of the liquid was essential to the phenomenon. The surface of the cork ball was, by means of a flame, *charred* to such a degree as to prevent entirely the immediate adhesion of water. When thus prepared, and placed on the stream under the most advantageous circumstances, it was *never sustained* a

moment, but was instantly and repeatedly thrown off, until it had become moistened. As soon as the water adhered to the whole surface, the ball was sustained as perfectly as it had been previously to its carbonization.

In the next place, to determine whether the impulse of the jet, in connection with the adhesive force of the liquid, were of themselves sufficient to sustain the ball, or whether a rotary motion of the ball was essential to the effect, the following method occurred to me:—A cork ball not charred, but susceptible of being wetted, was attached to one extremity of a thread of a length equal to that height above the adjutage at which the ball when allowed to rotate had been most readily sustained. The other extremity of the thread was then attached to the adjutage. When the cock of the fountain was turned, the ball rose, as usual, with a rotary and progressive motion, till the thread had become straight and tense. At that height at which its rotary motion was prevented by the tension of the thread, it was not susceptible of being sustained a moment, but was instantly thrown from the stream.

That the return of the ball in this case did not depend upon the elasticity of the string stretched by the momentum with which the ball ascended, was proved by the result of simply placing the ball in the jet at the requisite height, with the string already straight and tense; for under these circumstances it fell as before.

Having thus proved by separate experiments that to the support of the ball its own rotation and the adhesion of the liquid are both essential, I shall presently offer an explanation of the mode in which the support is effected.

A word first in relation to existing opinions. In the first place, the above facts are subversive of a hypothesis which has been advanced, that the ball is balanced between the branches of the streamlets into which the jet divides itself, as a body is supported in the forks of a tree. This notion is also obviously inconsistent with the fact that these streamlets are chiefly on one side, and that some inclination of the jet is advantageous, if not essential, to the sustaining of the ball, which always lies against the lower side of the jet. Again, it must first be placed

on that side: if placed exactly in the middle of the stream, it will not rise in such a manner as to be sustained. This excludes the theory which would attribute the support to the direct impulse of the jet, whether simple or divided. I say simple, because it has been supposed that the progressive expansion of the primary stream was itself favorable.

Another hypothesis, which has been sanctioned by high authority, is that the ball is chiefly sustained by the lateral currents of air brought toward the jet in consequence of the continued removal of air by the lateral adhesion of the ascending stream.

That this plays some part in the case of a ball sustained on a current of *air*, and that the principles are different in the two cases, I have satisfied myself, by observing certain striking differences between the phenomena. With air, a vertical current is most favorable; with water, a slight inclination. With water, a considerable rapidity of rotation is necessary, but little or no lateral oscillation takes place; with air, the ball has less—and sometimes scarcely any—rotary motion. When placed on the side of the current, it acquires a lateral oscillation from side to side of the current, as though met and driven back toward the centre by the centripetal force of the currents; but each time—like a pendulum—passing the middle by virtue of its inertia.

This is what would take place on water were the principle the same. But the phenomena are entirely different. And this dissimilarity might be expected. For in consequence of the great difference between air and water in point of specific gravity, air issues with a velocity more than 800 times as great as that of water under the same pressure. This must occasion an immense difference in the lateral currents drawn toward the main current in the two cases. With water, these play but a very subordinate part. Authors seem to have overlooked this, and taken it for granted that a similar explanation was to be given for both cases.

In explaining the support of the ball on a jet of water, I shall at first restrict the investigation to that which takes place in the circumference of that great circle of the ball whose plane passes through the jet.

By means of the attraction of the ball for the water, and of the water for itself, successive portions of this liquid, after arriving at the horizontal diameter of the ball, are continually diverted from the vertical direction, and carried along the upper surface of the ball in the circumference of a circle. By its centrifugal force it continually tends to escape, but is detained by the attraction of the ball for the liquid, and of the liquid for itself. This centrifugal force, acting at each point in the direction of the radius, continually urges the ball upwards and laterally towards the ascending jet; the resultant of the centrifugal forces at the different points being obliquely upwards, inclining toward the jet sufficiently to compensate for the effect of the horizontal component of the direct impulse of the jet on the ball at the point where it strikes it, below its horizontal diameter.

The ball, when at the requisite distance, is prevented from approaching nearer to the jet, by that increase—and consequent predominance—of this direct impulsive action which such an approximation would produce; and it is prevented from receding farther by the diminution of this impulse, and the consequent predominance of the centrifugal force—the force which urges the ball toward the jet.

Similar principles apply to the water which spreads itself obliquely over a segment of the ball.

The centrifugal force resulting from the inertia of the water, by which it tends to persevere in a rectilinear motion, sustains first the lamina of water itself, as it ascends obliquely over a segment of the sphere, and secondly it sustains the ball through the medium of the attraction of the water for itself and for the ball. This cohesion and this affinity perform the same office as the tension of a cord, which we may conceive to be attached at one of its extremities to the ball, and impelled at the other—and consequently rendered tense—by the impulse of a fluid. But as a string when acted on by the ball alone could not sustain the ball, so the adhesion of the ball to the fluid could not sustain it, without that centrifugal force of the fluid which sustains it against this action of the ball.

Experiment and theory concur to show, that water issuing under a given pressure differs from air, in requiring a larger

ball, and sustaining it at a greater height. Its surface must not only be adhesive, but of such an extent as to seize and deflect a sufficient quantity of the liquid. A much smaller portion undergoes a proper reflection at the moment of impulse, and is thrown off in the opposite direction. The force which produces this reflection tends to move the ball from the jet.

To illustrate the foregoing views by particular cases:—1. Suppose the jet to be nearly vertical, and the streamlets into which it is divided to be projected from the ball in a horizontal direction, and on the side opposite the primary stream. In this case, by the mutual affinity between the rotating ball and the water, and the cohesion between the particles of the latter, the vertical velocity of a portion of water has been destroyed, and a horizontal velocity eventually communicated to it. This could not have been effected except by forces whose resultant is directed obliquely downwards from the jet; and as the force exerted by the ball upon the water is exerted downwards and outwards, and as action and reäction are equal and opposite, it is evident that the force exerted by the same water upon the ball is equal to the former, and directed obliquely upwards toward the jet. Now this is decomposable into two forces, one horizontal, and one vertical. The horizontal component balances the horizontal component of the primary impulse; whilst the vertical component sustains that part of the weight of the ball which is not sustained by the vertical component of the primary impulse of the stream.

2. With an aëriform fluid, as air or steam, the jet will rapidly expand, and the ball will rest on a section of this inverted cone, whose direct impulse is aided by the lateral currents. Both forces diminish rapidly, and become inadequate at a moderate height. The rotation is moderate and unessential, and results from a difference of velocity in different parts of the impinging current. With air, I have supported marbles and balls of various sizes and materials, and have tested the velocity of the lateral currents by suspending bodies near the jet. The deflection was considerable with air, when scarcely sensible with water, under equal pressure. This result is in accordance with the above theory.

For the American Repertory.

Comparative View of the Weights, Measures and Coins of Great Britain, France, and the United States. By D. J. BROWNE, *Civil Engineer.*

WEIGHTS AND MEASURES OF GREAT BRITAIN,

Agreeably to the Act of Uniformity, which took effect 1st January, 1826.

TABLE OF IMPERIAL LONG MEASURE.

DENOMINATIONS.	*French Metres.*	*Inches.*	*Feet.*	*Yards.*	*Fathoms.*	*Rods.*	*Chains.*	*Furlongs.*	*Miles.*	*League.*
1 Inch,	0.02539954	1								
1 Foot,	0.30479449	12	1							
1 Yard,	0.91438348	36	3	1						
1 Fathom,	1.82876696	72	6	2	1					
1 Rod or Perch,	5.02910914	198	16½	5½	2¾	1				
1 Chain,	20.11643656	792	66	22	11	4	1			
1 Furlong,	201.16436560	7920	660	220	110	40	10	1		
1 Statute Mile,	1609.31492480	63360	5280	1760	880	320	80	8	1	
1 League,	4827.94477440	190080	15840	5280	2640	960	240	24	3	1

1 Geograph'l mile = 1.151515 Statute miles. 1 Statute mile = 0.868421 Geo. miles

Besides the above, there are the palm, which equals 3 inches; the hand, 4 inches; the span, 9 inches; the nail, 2¼ inches; the link, 7.92/100 inches, or one-hundredth of a chain; and the quarter, 4 nails or 9 inches.

TABLE OF IMPERIAL SUPERFICIAL MEASURE.

DENOMINATIONS.	*Square Metres.*	*Square Inches.*	*Square Feet.*	*Square Yards.*	*Square Rods.*	*Square Chains.*	*Square Roods.*	*Acres.*	*Sq. Mile.*
1 S. Inch,	0.000645	1							
1 " Foot,	0.092900	144	1						
1 " Yard,	0.836097	1296	9	1					
1 " Rod,	25.291939	39204	272¼	30¼	1				
1 " Chain,	404.671024	627264	4356	484	16	1			
1 " Rood,	1011.677560	1568160	10890	1210	40	2½	1		
1 " Acre,	4046.710240	6272640	43560	4840	160	10	4	1	
1 " Mile,	2589894.553600	4014489600	27878400	3097600	102400	6400	2560	640	1

TABLE OF IMPERIAL CUBIC OR SOLID MEASURE.

DENOMINATIONS.	*Cubic Metres.*	*Cubic Inches.*	*Cubic Ft.*	*Cubic Yds.*
1 Cubic Inch,	0.000016	1		
1 " Foot,	0.028315	1728	1	
1 " Yard,	0.764513	46656	27	1
1 " Ton of Rough Timber,	1.132612	69120	40	1.48148
1 " Ton of Hewn Timber,	1.415766	86400	50	1.85185
1 " Ton of Shipping,	1.189243	72576	42	1.55555

The inch is the shortest measure of extension to which a name is given; but subdivisions are used for many purposes. By mechanics it is commonly divided into *eighths*. By the officers of the revenue, and by men of science, it is divided into *tenths*, *hundredths*, &c. Formerly it was made to consist of twelve parts, called lines, but these have very properly fallen into disuse.

MEASURES OF FORCE OF GRAVITY OR WEIGHT.

It will be perceived by comparing the foregoing tables with those in use prior to the passing of the Act of Uniformity, that no alteration was made in the measures of Great Britain except in Liquid and Dry Measures, nor did that act affect the previously existing system of Weights. It was deemed expedient to preserve Troy Weight, because all the coinage had been uniformly estimated by it, as well as all medical prescriptions or formulæ under a peculiar subdivision, which the College of Physicians was most anxious to preserve. It was resolved, therefore, to continue the use of Troy Weight; and, also, on account of the accuracy of the Troy standard, to raise the Avoirdupois upon this basis.

TABLE OF IMPERIAL TROY WEIGHT.

Denominations.	*French Grammes.*	*Pounds Avoirdupois.*	*Grains.*	*Penny-weights.*	*Ounces.*	*Pound*
1 Grain,	0.06477	0.000142857	1			
1 Pennyweight,	1.55457	0.003428571	24	1		
1 Ounce,	31.09130	0.068571429	480	20	1	
1 Pound,	373.09560	0.822857143	5760	240	12	1

Troy Weight is used in the weighing of gold, silver, and precious stones, except diamonds.

The Troy pound is equal to the weight of 22.815 cubic inches of distilled water, weighed in air at 62° F., barometer being at 30 inches.

Diamond Weight.—The weight of diamonds is estimated by carats, each of which is divided into four grains, and each grain into 16 parts. The diamond carat weighs $3\frac{1}{6}$ grains Troy nearly, or 0.20522 French grammes. The Troy ounce is equal to $151\frac{1}{2}$ carats; and the Avoirdupois ounce, $138\frac{1}{12}$ carats nearly.

TABLE OF IMPERIAL APOTHECARIES' WEIGHT.

Denominations	*French Grammes.*	*Pounds Avoirdupois.*	*Grains.*	*Scru-ples.*	*Drams.*	*Ounces.*	*Pound.*
1 Grain,	0.06477	0.000142857	1				
1 Scruple,	1.29547	0.002857143	20	1			
1 Dram,	3.88641	0.008571429	60	3	1		
1 Ounce,	31.09130	0.068571429	480	24	8	1	
1 Pound,	373.09560	0.822857143	5760	288	96	12	1

This weight is essentially the same as Troy Weight, but differently divided. It is chiefly used for medical prescriptions; but drugs are mostly bought and sold by Avoirdupois Weight.

TABLE OF IMPERIAL AVOIRDUPOIS WEIGHT.

Denominations.	*French Grammes.*	*Troy Pounds.*	*Drams.*	*Ounces*	*Lbs.*	*Quar-ters.*	*Cwt.*	*Ton.*
1 Dram,	1.77115	0.004747	1					
1 Ounce,	28.33843	0.075955	16	1				
1 Pound,	453.41480	1.215278	256	16	1			
1 Quarter,	12695.6144	34.027778	7168	448	28	1		
1 Hundred Weight,	50782.4576	136.111111	28672	1792	112	4	1	
1 Ton,	1015649.1520	2722.222222	573440	35840	2240	80	20	1

1 lb. Avoirdupois = 7000 Troy grains.

In 1834 it was enacted in the British Parliament, that all local and customary measures should be abolished under a penalty of 40*s.*, and all contracts made after the passing of that act, by heaped measure or by the use of lead or pewter weights, should be null and void. It was further enacted, that coal shall in all cases be sold by weight; that, with the exception of gold, silver, platinum, diamonds and other precious stones, (which may be sold by Troy Weight) and drugs, (which may be sold by retail by Apothecaries' Weight) all other articles sold by weight shall be sold by Avoirdupois only; and that a stone shall, in all cases, consist of 14 lbs. Avoirdupois, and a cwt. of 8 such stone, &c.

TABLE OF IMPERIAL LIQUID AND DRY MEASURE,

Deduced from the Standard Gallon, containing 10 *lbs. Avoirdupois of distilled water, temperature* 62° *F., barometer* 30 *inches.*

Denominations.	*Weight of Water.*	*Cubic Contents.*	*French Litres.*	*Gills.*	*Pints.*	*Quarts.*	*Gallons.*	*Pecks.*	*Bushels.*	*Coom.*	*Quart'r.*
1 Imperial Gill,.....	...5 oz.	.. 8.665 in.	.. 0.14198306	...1	...	...	..	..	..	..	..
1 " Pint,.....	...1¼ lbs	34.659 "	.. 0.56793225	...4	..1	...	..	..	..	..	..
1 " Quart,.....	...2½ "	69.319 "	.. 1.13586449	...8	..2	..1	..	..	..	..	..
1 " Gallon, ...	..10 "	277.274 "	.. 4.54345797	..32	..8	..4	1	..	..	..	..
1 " Peck,.....	..20 "	554.548 "	.. 9.08691594	..64	16	..8	2	1	..	..	..
1 " Bushel, ...	..80 "	1.28368 ft.	36.34766376	256	64	32	8	4	1	..	..
1 " Coom,.....	320 "	5.1347 "	145.39065504	1024	256	128	32	16	4	1	..
1 " Quarter, ..	640 "	10.2694 "	290.78131008	2048	512	256	64	32	8	2	1

TABLE OF IMPERIAL LIQUID AND DRY MEASURE,

Compared with Wine and Winchester Measures of the United States.

Denominations.	*Wine Gills.*	*Wine Pints.*	*Wine Quarts.*	*Wine Gallons.*	*W'r Bushels.*
1 Imperial Gill,.....	1.20032	.....	.....	.....	.....
1 " Pint,.....	4.80128	1.20032	.....	.....	.....
1 " Quart, ...	9.60256	2.40064	1.20032	.....	.....
1 " Gallon, ...	38.4102	9.60256	4.80128	1.20032	.....
1 " Bushel,.....	307.282	76.8205	38.4102	9.60256	1.03153
1 " Coom,.....	1229 13	307.282	153.641	38.4102	4.12612
1 " Quarter,.....	2458.26	614.564	307.282	76.8205	8.25224

TABLE OF FACTORS,

For converting old measures into new, and the contrary.

	BY DECIMALS.			BY VULGAR FRACTIONS.		
	Corn Measure.	*Wine Measure.*	*Ale Measure.*	*Corn Meas.*	*Wine Meas.*	*Ale Meas.*
To convert old measures to new, multiply by	0.96943	0.83311	1.01704	$\frac{31}{32}$	$\frac{5}{6}$	$\frac{60}{59}$
To convert new measures to old, multiply by	1.03153	1.20032	0.98324	$\frac{32}{31}$	$\frac{6}{5}$	$\frac{59}{60}$

The *old Ale Gallon* contained 282 cubic inches.
The *old Wine Gallon* contained 231 cubic inches.
The *old Winchester Bushel* contained 2150.42 cubic inches.
The *Imperial Bushel* contains 2218.192 cubic inches.

*** The relative quantities of the weights and measures, as given in these tables, are deduced from the report of M. Mathieu, to the Royal Academy of Sciences of France, on the British "Act of Uniformity," passed May 17th, 1824, and was subsequently published by the Royal and Central Society of Agriculture of Paris, in the *Annuaire* for 1829.

GOLD AND SILVER COINS OF GREAT BRITAIN.

Denominations.	Legal Weight.		Standard.	Intrinsic Value.			Usual current value in U. S.
	Grains	Grammes.		Shil'gs	Frs. C.	D. C. M.	D. C.
1 Guinea	129.50	8.380	.9166 fine	21	26.47	5 11 3	5 05
1 Sovereign.....	123.25	7.981	.9166 fine	20	25.21	4 86 6	4 85
1 Crown	436.36	28.251	.9250 fine	5	5.81	1 07 3	1 10
1 Shilling.....	87.27	5.650	.9250 fine	1	1.16	0 21 5	0 22

WEIGHTS AND MEASURES OF FRANCE.

MEASURES OF LENGTH,
Compared with English Imperial Measure.

Denominations.	*Metres.*	*Inches.*	*Feet.*	*Yards.*	*Rods.*	*Stat. Miles.*
1 Millimetre,.....	.. 0.001	0.039371	0.003281	0·001094	0.00020	0.0000006
1 Centimetre,.....	... 0.01	0.393708	0.032809	0.010936	0.00199	0.0000062
1 Decimetre,.....	.... 0.1	3.937079	0.328090	0.109363	0.01988	0.0000621
1 Metre, ...	1	39.37079	3.280899	1.093633	0.19884	0.0006214
1 Decametre,.....	10	393.7079	32.80899	10.93633	1.98842	0.0062138
1 Kilometre, ...	...1000	39370.79	3280.899	1093.633	198.8424	0.6213822
1 Myriametre, ...	..10000	393707.9	32808.99	10936.33	1988.424	6.2138218

1 Toise = 1.949037 metres.
1 Metre = 0.513074 toises.

1 Toise = 6.39459259 I. feet.
1 I. Foot = 0.15638212 toises.

The *metre* is equal to $\frac{1}{10000000}$ part of the distance between the equator and north pole.

MEASURES OF SURFACE,
Compared with English Imperial Measure.

Denominations.	*Sq. Metres.*	*Sq. Inches.*	*Sq. Feet.*	*Sq. Yards.*	*Sq. M.*
1 Sq. Millimetre,.....	.. 0.000001	0.00155005914	0.000010764	0.00000120	.....
1 " Centimetre,.....	.....0.0001	0.15500591366	0.001076430	0.00011960	.....
1 " Decimetre,.....	..... 0.01	15.5005913664	0.107642996	0.01196033	.....
1 " Metre,.....	1	1550.05913664	10.76429956	1.19603328	.....
1 " Decametre, ...	100	155005.913664	1076.429956	119.603328	.....
1 " Hectometre,.....	10000	15500591.3664	107642.9956	11960.3328	0.0039
1 " Kilometre,.....	...1000000	1550059136.64	10764299.56	1196033.28	0.3861
1 " Myriametre,.....	100000000	155005913664.	1076429956.	119603328.	38.611

LAND MEASURE.

Denominations.	*Sq. Metres.*	*Sq. Yards.*	*Sq. Rods.*	*Roods.*	*Acres.*
1 Centiare,.....	 1	1.1960333	0.0395383	0.0009885	0.0002471
1 Are,.....	100	119.60333	3.9538290	0.0988457	0.0247114
1 Hectare,.....	10000	11960.333	395.38290	9.8845725	2.4711431

MEASURE OF CAPACITY,
Compared with English Imperial Measure.

Denominations.	*Cubic Met.*	*Cubic Inches.*	*Cubic Feet.*	*Cubic Yards.*
1 Cubic Centimetre,.....	.. 0.000001	0.0610270533794	0.0000353165	0.000001308
1 " Decimetre,.....	..... 0.001	61.027053379431	0.0353165818	0.001308022
1 " Metre,.....	1	61027.053379431	35.316581817	1.308021549
1 " Decametre,.....	1000	61027053.379431	35316.581817	1308.021549
1 " Hectometre,.....	...1000000	61027053379.431	35316581.817	1308021.549
1 " Kilometre,.....	1000000000	61027053379431.	35316581817.	1308021549.

WOOD AND TIMBER MEASURE.

Denominations.	*Cubic Metres.*	*Cubic Inches.*	*Cubic Feet.*	*Cords.*
1 Millistere,	0.001	61.0270534	0.035317	0.00028
1 Centistere,	0.01	610.270534	0.353166	0.00276
1 Decistere,	0.1	6102.70534	3.531658	0.02759
1 Stere,	1	61027.0534	35.31658	0.27591

LIQUID AND DRY MEASURE.

Denominations.	*Cubic Metres.*	*Gills.*	*Pints.*	*Quarts.*	*Gallons.*	*Bushels.*
1 Decilitre,	0.0001	0.704309	0.176077	0.088039	0.022010	0.00275
1 Litre,	0.001	7.043094	1.760773	0.880387	0.220097	0.02751
1 Decalitre,	0.01	70.43094	17.60773	8.803867	2.200967	0.27512
1 Hectolitre,	0.1	704.3094	176.0773	88.03867	22.00967	2.75121
1 Kilolitre,	1	7043.094	1760.773	880.3867	220.0967	27.5121

LIQUID AND DRY MEASURE,
Compared with Wine and Dry Measures of the United States.

Denominations.	*Cubic Metres.*	*Gills.*	*Pints.*	*Quarts.*	*Gallons.*	*W'r Bushels.*
1 Decilitre,	0.0001	0.845397	0.211349	0.105675	0.026419	0.003305
1 Litre,	0.001	8.453966	2.113492	1.056746	0.264186	0.033047
1 Decalitre,	0.01	84.53966	21.13492	10.56746	2 641864	0.330466
1 Hectolitre,	0.1	845.3966	211.3492	105.6746	26.41864	3.304664
1 Kilolitre,	1	8453.966	2113.492	1056.746	264.1864	33.04664

MEASURES OF GRAVITY OR WEIGHT,
Compared with Troy Weight.

Denominations.	*Cubic Metres of Water.*	*Grains.*	*Penny-weights.*	*Ounces.*	*Pounds.*
1 Decigramme,	0.0000001	1.54384	0.0643	0.00322	0.00027
1 Gramme,	0.000001	15.4384	0.6432	0.03216	0.00268
1 Kilogramme,	0.001	15438.4	643.26	32.16324	2.68027

MEASURES OF GRAVITY OR WEIGHT,
Compared with Avoirdupois Weight.

Denominations.	*Cubic Metres of Water.*	*Gram-mes.*	*Drams.*	*Ounces.*	*Pounds.*
1 Gramme,	0.000001	1	0.5646029	0.035288	0.00221
1 Decagramme,	0.00001	10	5.6460288	0.352877	0.02205
1 Hectogramme,	0.0001	100	56.460288	3.528768	0.22055
1 Kilogramme,	0.001	1000	564.60288	35.28768	2.20548
1 Myriagramme,	0.01	10000	5646.0288	352.8768	22.0548

The *kilogramme* is equal in weight to a cubic decimetre of pure water, at 39.38° F., or 1 litre of water of the same temperature. Hence a cubic metre of water contains 1000 litres, and weighs 1000 kilogrammes.

A *quintal* is 100 kilogrammes, and is equal to 220.548 pounds.

A *millier* (used for marine tonnage) is 1000 kilogrammes, and is equal to 2205.48 pounds.

GOLD AND SILVER COINS OF FRANCE.

Denominations.	Legal Weight.		Standard.	Intrinsic Value.						Usual current value in U. S.	
	Grammes.	Grains.		Francs.	s.	d.	D.	C.	M.	D.	C.
1 Napoleon.....	6.45161	99.60	900 fine	20	15	10.41	3	86	0	3	85
1 Franc.....	5.00000	77.19	.900 fine	1	0	9.41	0	18	7	0	18¾
1 Five-franc piece	25.00000	385.95	.900 fine	5	3	11.03	0	93	6	0	93

WEIGHTS AND MEASURES OF THE U. STATES.

As the imperial system, and that which preceded it in England, are essentially the same as the weights and measures of the U. S., except wine, beer, and dry measures, a repetition of them is unnecessary. The relative quantities of wine and dry measures are as follows:—

TABLE OF WINE MEASURE.

Denominations.	*Cubic Contents.*	*Weight of Water at 40° F.*	*French Litres.*	*Imperial Gallons.*	*Win'r Bushels.*	*W. Gills.*	*W. Pints.*	*W. Quarts.*	*W. Galls.*	*Hhds.*	*Pipes.*	*Tun.*
1 W. Gill, ...	.7$\frac{7}{32}$ in.	..0.261 lb.	.. 0.1183	0.02603	.....	...1	.....	.....	...	..	..	..
1 " Pint, ...	.28$\frac{3}{32}$ "	..1.044 "	.. 0.4732	0.10414	.....	...4	...1	.....	...	..	..	..
1 " Quart,..	.57$\frac{3}{4}$ "	..2.089 "	.. 0.9463	0.20828	.....	...8	...2	...1	...	..	..	..
1 " Gallon,..	.231 "	..8.355 "	.. 3.8752	0.83311	0.107	..32	...8	...4	..1	..	..	..
1 " Hogshed	8.421 ft.	526.367 "	238.4676	52.4859	6.767	2016	.504	.252	.63	1	..	..
1 " Pipe,...	16.84 "	1052.73 "	476.9352	104.972	13.53	4032	1008	.504	126	2	1	..
1 " Tun,...	33.68 "	2105.46 "	953.8705	209.944	27.06	8067	2016	1008	252	4	2	1

1 tierce = 42 gallons. 1 puncheon = 84 gallons.

TABLE OF DRY OR WINCHESTER MEASURE.

Denominations.	*Cubic Contents.*	*French Litres.*	*Imperial Bushels.*	*Wine Gallons.*	*Winch'r Gills.*	*Winch'r Pints.*	*Winch'r Quarts.*	*Winch'r Pecks.*	*W'r Bush.*	*Cooms.*	*Quarters.*	*Wey.*
1 W'r Gill, ...	..8.40 in.	0.1376	0.00379	0 0364	1	.....	.....	.....	..	..	..	..
1 " Pint, ...	.33.60 "	0.5506	0.01515	0.1455	4	...1	.....	.....	..	..	..	..
1 " Quart, ...	.67.20 "	1.1011	0.03029	0.2909	8	...2	...1	.....	..	..	..	..
1 " Peck,.....	537.60 "	8.8091	0.24236	2.3273	...64	..16	...8	...1	..	..	..	..
1 " Bushel,....	.1.244 ft.	35.2365	0.96943	9.3092	..256	..64	..32	...4	1	..	..	..
1 " Coom, ...	.4.977 "	140.946	3.87772	37.2367	1024	256	128	..16	4	1	..	..
1 " Quarter, ..	.9.954 "	281.892	7.75544	74.4734	2048	512	256	..32	8	2	1	..
1 " Wey, ...	49.770 "	1409.46	38.7772	372.367	10240	2560	1280	160	40	10	5	1

4 *weys* = 1 *last* = 80 *bushels.*

The Winchester bushel contains 77.7785 pounds of pure water, of the temperature of 40° F.

GOLD AND SILVER COINS OF THE UNITED STATES.

Denominations.	Legal Weight.		Standard.	Intrinsic Value.						
	Grains.	Grammes.		s.	d.	Fr.	c.	D.	C.	M.
1 Eagle, coined before 1834	270.0	17.488	.9166 fine	43	9.75	55	22	10	65	9
1 Eagle, of 1834 to 1837...	258.0	16.711	.8992 fine	41	0.83	51	76	9	99	1
1 Eagle, coined since 1837	258.0	16.711	.9000 fine	41	1.26	51	80	10	00	0
1 Dollar, coined before 1837	416.0	26.944	.8924 fine	4	7.94	5	34	1	00	0
1 Dollar, coined since 1837	412.5	26.718	.9000 fine	4	7.94	5	34	1	00	0

[For the American Repertory.]

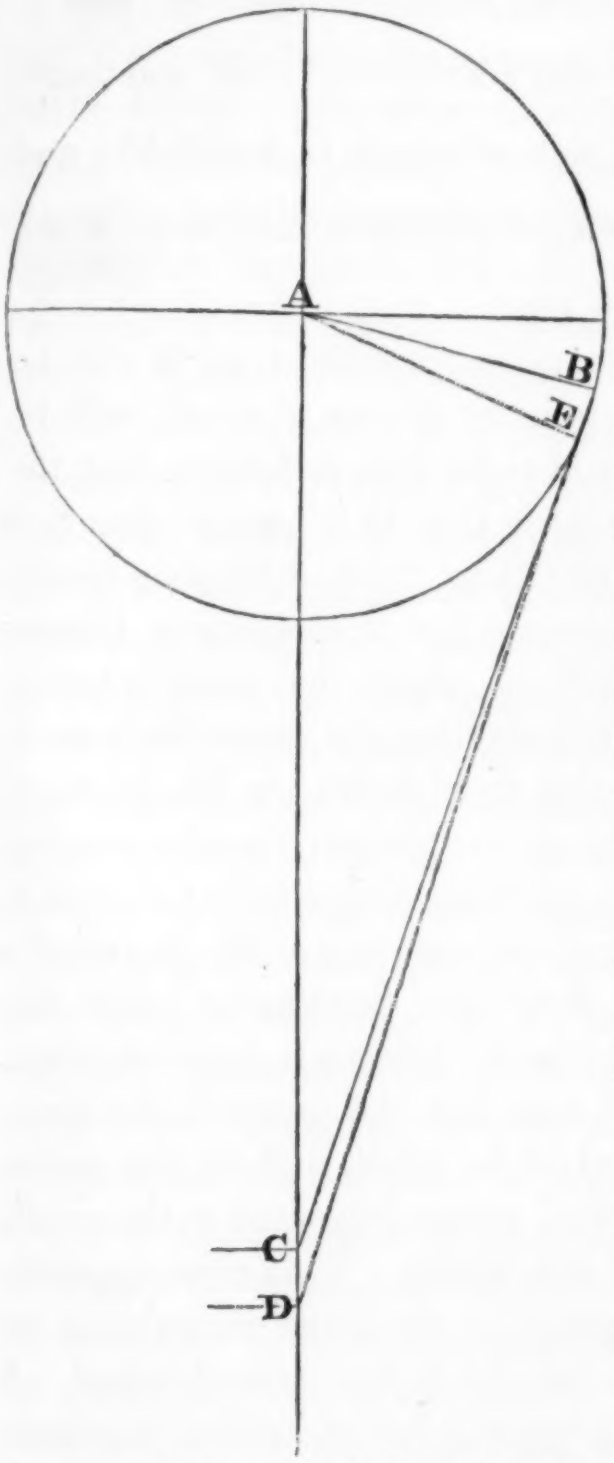
ON LONG AND SHORT CONNECTING RODS.

There is perhaps no subject relating to the steam-engine, on which the opinions of engineers differ more, than with regard to the length of the connecting rod. The very able article in your pages, for February, under the head of Progress of Science, extracted from the London Mechanics' Magazine, must therefore have been welcome to all your professional readers, as being well calculated to correct erroneous opinions on the subject. With this view of the useful information for which your readers are indebted to you by the insertion of the article alluded to, it is a matter for regret that its desirable tendency should have been counteracted, and the truths contained therein rendered doubtful, by the communication of your correspondent "C." in the last number of the Repertory.

Proneness to criticise has ever been the characteristic of superficial knowledge; and this fact alone offers an explanation why such a severe judgment as that passed upon Mr. Seaward should emanate from a source where evidently the first rudiments of mathematics are wanting.

It will be proper, before entering into the detail of the subject, to discuss the merits of the concluding remark of "C." that he is "fully satisfied that no engineer of *sound mind* and common understanding would pretend that by transmitting the power through the angle formed by the connecting rod, it was to be increased." Now, if I shall succeed in convincing the reader by mathematical proof, that *owing to that angle* the force urging the crank round shall at any time be greater than the absolute force of the piston, I have then at the very outset established the fact that Mr. Seaward is not destitute of that knowledge which is possessed by engineers of sound mind and common understanding; whilst at the same time I establish the more important fact that the table presented by "C." is erroneous; by reference to which table it will be seen, that at the greatest angle of the connecting rod, the force stated to be communicated to the crank falls short of that of the piston by $\frac{38}{1000}$ parts; the

complete fallacy of which I will now proceed to prove by the following demonstration: Let A B represent the position of the crank after having advanced 103° from the top centre, and let



B C represent the connecting rod of exactly three times the length of the crank: suppose also AE and ED to represent the positions of the crank and connecting rod after having advanced 10° further, or 113° from the top centre. I now contend that the arc B E is less than the straight line CD; or in other words, that the piston passes through a greater space than the crank, (or more exactly, the centre of the crank-pin) during the time that the latter advances from B to E. Now, in order to obtain the distance C D, it is evident that A C and A D must be ascertained by first determining the angles A B C and A E D.

The sides of plane triangles being proportional to the sines of their opposite angles, it follows that CB : BA=sin.∠ BAC : sin.∠ACB.

Suppose AB or AE=1000, the logarithm of which is 3.000000, B C or E D will then be 3000, and their log. 3.477121.

The angle B A C being 180°−103°=77°, its logarithmic sine will be 9.988724 and EAD being 180°−113°=67°, its log. sine will be 9.964026; hence the log. sine of ∠ACB=3.000000+ 9.988724−3.477121=9.511603, which corresponds to 18° 57′. The remaining ∠ABC will therefore be 84° 3′ and its log. sine

9.997654. But sine ∠CAB : sine ∠ABC=BC : AC ; hence, 9.997654+3.477121−9.988724=log. 3.486051=3062, the distance from A to C.

A D will be determined in the same manner; for sine ∠ $ADE=\frac{EA \times \text{sine } EAD}{DE}$ = log. sine 9.485905=17° 52′ and therefore, ∠DEA=95° 8′, the log. sine of which is 9.998255; and hence, $AD=\frac{\text{sine } DEA \times ED}{\text{sine } DAE}$ = log. 3.511350=3246, from which deduct 3062, when CD will be 184.

A B being 1000, a complete circle described by B will be 6282, and the arc B E, which forms $\frac{1}{36}$ part thereof, will be 174.5. C D having been proved to be 184, it follows that the speed of the piston in passing from C to D is greater than that of the crank in the proportion of 184 to 174.5, difference nearly $\frac{1}{20}$. Now, by applying the universal law in mechanics, (exemplified by the lever and the inclined plane) that what is lost in speed is gained in power, it follows that the mean force communicated to the crank in passing through the arc BE is nearly $\frac{1}{20}$ greater than the actual force of the piston; thereby proving incontestibly the fallacy of the table presented by "C." and at the same time fully corroborating the accuracy of Mr. Seaward's calculations. Let us select from Mr. Seaward's table the nearest angles to those assumed in the foregoing demonstration, viz. 100° and 110°, it will be seen that the mean of the force imparted to the crank is stated to be 1049, that of the piston being 1000, showing an excess of power imparted to the crank of $\frac{1}{21}$ part nearly over that of the piston. This close approximation to the result before given is the more remarkable on considering by what different process it has been obtained. I would here observe that the foregoing demonstration has been adapted to settle, in a manner comprehensible even to those who have not made mathematics their study, the important question whether or not the force of the crank at any time exceeds that of the piston; and, I may add, that the conclusion arrived at being based on the immutable law which governs all matter in motion, its accuracy cannot be doubted.

In presenting the erroneous table, calculated by what he

conceives to be the correct formula, "C." prefixes the following extraordinary remark: "It will be seen, by examining this table, that we arrive at very different results from those presented in Mr. Seaward's table; and instead of the power exerted to turn the crank being the same in both cases, it is as 106 to 112; or the *difference* somewhat exceeds *five per cent of the whole power exerted upon the piston.*" I would here ask any engineer of "sound mind," what has become of the $5\frac{3}{4}$ per cent of power exerted by the piston, but, according to this singular table, not received by the crank? It should be borne in mind that *friction* is not counted in this estimate, but forms a separate item in "C.'s" calculations. The proposition then is clear: a certain amount of power is exerted by the piston, and imparted to that end of the connecting rod nearest thereto, but the whole amount of that power is, some how or other, not received by the crank; now there is no other connection than the said rod; *ergo*, the connecting rod does not *transmit* all the power it *receives!* The absurdity of such a proposition is self-evident; and proves, independently of the foregoing calculations, the utter fallacy of the table. On the other hand, the very fact of Mr. Seaward's arriving at similar results with regard to the *total force* transmitted by the long and short connecting rods, proves that his calculations may be depended upon; in further support of which, I will here quote the first authority on the *theory* of the steam-engine, viz. Tredgold, who, in demonstrating the variation of rotary force, when a crank is impelled by a constant force, by means of connecting rods of various lengths, concludes by observing, "if we sum up the forces acting in the circle, we find them exactly equal to the mechanical power in a straight line, the additional friction excepted." Indeed, this conclusion is so evident that any one conversant with the first principles of mechanical philosophy will at once perceive its truth.

The next important error to be noticed is the assertion, "that the angular thrust or action at the point C will vary with the crank in its different positions as the *sines* of the angle A C B," and "that the pressure upon the points B and C, in the direction of the line BC, and consequently the friction at these points *will vary in the same manner.*" The gross absurdity of this sup-

position is so manifest as hardly to require being pointed out. Compare the sines of the angles formed by the connecting rod, when the crank is placed at 5° and 90° respectively; the former being only 2908, whilst the latter is 33381, it will be seen that the thrust in the latter case would be upwards of *eleven* times greater than in the former, were "C." right in his theory. That such however cannot be the case will be readily admitted, without referring to the preceding demonstration, proving the greatest variation of thrust to amount to only $\frac{1}{20}$ of the whole. The positive assertion, that the thrust "will vary *as the sines* of the angles of the connecting rod, and *not as the secants*," needs no contradiction after what has been just stated. A moment's reflection on the different properties of sines and secants will convince any one that the *sine* cannot in the present instance be substituted for the *secant*. The sine begins with a quantity infinitely small, which is doubling, trebling, &c. in value, with but a small increase of the angle, and therefore cannot represent the *thrust*, which, as before shown, is nearly uniform; the secant, on the other hand, commences with a definite quantity, subject to but a small increase for the angles appertaining to the connecting rod.

With regard to the 4th and 5th columns of the table, I am compelled to designate their contents as sheer nonsense, the figures given being simply an abbreviation of the *logarithmic values* of the sines of the various angles A C B. How these figures are made to represent the thrust, which we are told varies as *the sines* of the said angle, is a complete enigma. It is true, that by confounding the curtailed *logarithmic values* with the *sines*, the absurdity of the advanced theory becomes less glaring; but if we carry out the principle of the table to the extreme inclinations of the crank, the disguised fallacy becomes exposed. Take, for instance, as the table directs, the logarithmic value of the angle of the connecting rod when the crank has advanced 3′ from the centre, which will be 6.463726; compare this to the log. value of the angle of the connecting rod when the crank has advanced 30′ from the centre, or 7.463725, when it will appear that whilst the angular position of the connecting rod has changed only 9′ (that is, whilst the crank-pin

of a 3 feet crank has advanced less than $\frac{3}{8}$ inch) the thrust has increased $\frac{1}{6}$! Contrast this to the foregoing proof, by which it has been established that the increase of thrust during nearly one quarter of a turn of the crank amounts to only $\frac{1}{20}$.

Having disposed of the subject as far as relates to the supposed loss of useful effect in turning the crank consequent on the short connecting rod, the friction attending it next claims our serious consideration. On this point Mr. Seaward has given such an admirable demonstration, that I cannot do better than to subjoin the same; in doing which, I beg it to be understood that I coincide in every thing contained therein:

"The second objection brought against the short connecting rod is the increase of friction thereby occasioned. Now, as regards the actual friction upon the two joints B and C, there is unquestionably some truth in the assertion; for in the first place, there is an increase in the strain upon the short connecting rod as compared with that in the long connecting rod; the strain, as already stated, being as the secant of the angle A C B. Again, the greatest angle formed with the vertical by the short connecting rod is 19° 28′, while the greatest angle formed by the long connecting rod is only 9° 36′, and the secants of these two angles are as 106.063 to 101.420; that is, as about 23 to 22, or a difference of about $\frac{1}{23}$. But this difference occurs only at the extreme angles; for at the vertical points, the strain in both connecting rods is manifestly the same; therefore, taking the entire rotation, the strain on the two connecting rods will differ only about $\frac{1}{45}$, and the quantity of friction upon those two joints is certainly not more than about $\frac{1}{20}$ of the entire friction of the engine; consequently, the increase of friction caused by the extra strain on the short connecting rod is only about $\frac{1}{900}$ part; a quantity so exceedingly insignificant as to be practically of no consequence.

"However, besides the trifling increase of friction caused by the extra strain, some allowance must be made for the increased angular motion about the joint C of the short connecting rod, which angular motion is double that of the long connecting rod; but the quantity of friction on the two joints B and C, as before

stated, cannot be estimated at more than $\frac{1}{20}$ of the entire friction of the engine; and of this quantity, only $\frac{1}{10}$ is due to the joint C, because the joint B revolves through a complete circle, or 360°, while the joint C moves only in an angle of less than 20° —that is, $\frac{1}{18}$ part of the former: therefore, the increase of friction occasioned by the increased angular motion of the short connecting rod upon the joint C will only be $\frac{1}{200}$ part of the whole, which quantity added to the former, makes an addition of $\frac{1}{166}$ part of the whole friction of the engine; a quantity much too small to be considered in the light of a serious objection to the principle of the Gorgon engine.

"But it has been assumed that the joint C in the beam engine moves up and down in a vertical line, the same as in the Gorgon engine: this, however, is not the case; for it moves in the arc of a circle, which adds materially to the angular motion of this joint in the long connecting rod of the beam engine. Besides, this joint has also a very great addition to its angular motion in consequence of the angular motion of the beam on the main gudgeons. It is therefore capable of easy proof that the quantity of motion on the joint C of a beam engine is considerably greater than that in the Gorgon engine with a connecting rod of half the length. True, there are in the Gorgon engine the joints L, M, and H, of the parallel motion, which also give a certain amount of friction; but, on the other hand, there are in the beam engine the much more objectionable joints of the side rods and of the main gudgeons, the friction of which is considerably greater than that of the parallel motion of the Gorgon engine. On the whole, it can be shown that there is much less friction on all the joints above enumerated in the Gorgon engine than in the corresponding joints of a beam engine with a connecting rod of double the length."

The unfavorable conclusion drawn by "C." on no better authority than the loose statements he quotes respecting the performance of the Gorgon steam-frigate, is highly censurable. The diameter of the Gorgon's paddle-wheels is stated at $26\frac{1}{3}$ feet, the number of revolutions at 19, and the utmost speed of the vessel at 9 statute miles per hour! Let us see whether this

is a probable story: $26\frac{1}{3}$ feet diameter is 82.76 circumference, which, multiplied by 19 revolutions, gives 1572.44 feet per minute, or 94,346 feet per hour; this, divided by 5280, gives a a speed of 17.86 miles per hour at the circumference of the paddle wheel. Now, "any engineeer acquainted with the subject," well knows that the slip cannot, as here stated, amount to one half, and that therefore more than 9 statute miles must be produced with such a speed of the paddles; and I feel confident that "C." on due reflection, will perceive that he has been imposed upon, and that he has given credence and circulation to a statement which is highly incorrect.

Reviewing all that has now been said on the subject, the reader can hardly fail to consider the following remark of "C." as being, to say the least, very unfair, viz. "we are not surprised that after thus failing to prove practically the efficiency of his engines, that he [Mr. Seaward] should endeavor to do it by *geometrical investigation*." In juxtaposition to this sentence, I will here sum up by stating, that the whole of the foregoing reasoning and demonstration proves that the Gorgon engine, *with its short connecting rod*, is in no respect inferior in effect as compared to the ordinary British marine engine, and that therefore the simplicity of construction and vast saving in weight and space remain as important advantages in favor of Mr. Seaward's engine.

In taking leave of the subject, I must advert to the disingenuous construction put on Mr. Seaward's demonstration, relative to the power of the crank being, in some particular position of the connecting rod, greater than the actual force of the piston. "C." declares this to be "in direct contradiction to Mr. Seaward's former assertion, that '*no arrangement of levers, rods or cranks will produce or give power;*'" and he adds, "how this contradiction is to be reconciled we cannot understand; we leave this to Mr. Seaward." Now Mr. S. has stated distinctly, that although the power imparted to the crank by the short connecting rod by reason of its increased angle is at one time greater, still the total amount of power given to the crank during each rotation will be alike for either the long or short connecting rod. "C." on the other hand, actually proves that power to the amount

of $5\frac{3}{4}$ per cent will be gained by using the long instead of the short connecting rod. How this is to be reconciled I cannot understand. I leave this to "C."

J. E.

New-York, April 15, 1841.

For the American Repertory.

LYCEUM OF NATURAL HISTORY.

PROCEEDINGS.

June. Mr. Tuttle presented a specimen of coal penetrated by iron pyrites, from Iowa. At the request of the President, he made some observations on the geology of that territory. He stated that the country was of a secondary formation, and the limestone was found only on the margin of the rivers, being covered at all other places with a deep soil. Encrinital limestone has been found at Iowa city, but not elsewhere, and the only primitive rocks were boulders of granite, which lay scattered over the prairies northward of the 41° of latitude.

Mr. Henwood gave an account of the manner of preparing *kaolin* in Cornwall. The decomposed granite (*protogene* of the French) is washed with water, and allowed to settle for a few minutes; the water is then drawn off into large pans, where it is evaporated by the heat of the sun, and occasionally by artificial heat. When it acquires the consistency of thick cream, it is pumped up, moulded, cut into pieces of a certain size, and set aside to dry. He remarked that when the pieces were cut in one direction, they presented a smooth surface, but in any other direction the surface was striated or rough.

Dr. Jay presented specimens of Sabella ———, from the coast of Massachusetts. Mr. Mapes, in behalf of Mr. Tuttle, presented Madreporite, Encrinital limestone, Calcedony, Cyathophyllite, and Encrinites, from Iowa. Mr. Frost presented the 5th Geological Report of the State of Tennessee. Dr. Budd presented specimen of Strombus latissimus. The 3d and 4th Geological Reports of the State of New-York was received from G. C. Verplanck, Esq. A treatise on the Heat of Vapor and on Atmospheric Refraction, by W. Lubbock, Esq. from the author. The 7th Report of the British Association for the Ad-

vancement of Science, from the Association. Mr. Crocker presented specimens of Kaolin from Sterling, N. J. Mr. Wintringham presented specimens of Cyrena carolinaensis, Turbo irroratus, and Achatina glans, from Florida.

The Corresponding Secretary laid upon the table the following works which he had received:—The Natural Philosophy of Ponderable Bodies, by A. Avegando, from the author; Greenwich Observations for 1838; Edinburgh Observations, vol 2d, from the Royal Astronomical Society of London; Transits as observed and Calculations of the apparent Right Ascension for 1834; Zenith Distances observed at the Cape of Good Hope, and Calculations of the Geocentric South Polar Distances for 1836–7, from the Lords of the Admiralty.

Mr. W. Cooper presented the following fossil shells from the north of France:—Turrilite costatus, Scaphites obliquus, Trochus Rodani, Nautilus ——? Terebratula cornea, Ammonites varians, Am. Gentoni, Terebratula Bigona, Cassis Avellana, Galerites albogale, Spatangus lævis. Dr. Torrey presented specimens of Madrepore converted into calcedony, from Tampa Bay, Florida, and several clay concretions from Natchez, Miss. Dr. Lee read a paper entitled, 'On a Filaria in a Horse's Eye, and on other Entozoa in the Bodies of Animals.'* Audubon's Birds of America, Nos. 10 and 11; American Repertory, vol i, No. 5; London and Edinburgh Philos. Magazine, No. 105, and the Mag. of Nat. History, No. 112, were received.

Mr. Charles Handy was elected a resident member.

July. Mr. Cozzens, from the committee to whom was referred the fossil from the London clay presented by Dr. Draper, reported that it was the head of a fish, allied to the bony scaled Pike, Lepisosteus osteus, Cuv. Mr. Mapes exhibited a number of electrotype medals made by Mr. Mason. The President, on behalf of Mr. Wells, presented a live Agama cornuta from Texas: the thanks of the Society were voted to Mr. Wells for his donation. Mr. Thompson presented specimens of granite containing garnets, and garnets from Throg's Neck. Mr. Redfield exhibited a mollusca taken in the Hudson, near Fort Lee.

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* This paper was afterwards published in Silliman's Journal, vol. xxxix, p. 278.

Dr. Jay, on behalf of Mr. Dickinson, presented a fine specimen of asbestos from Staten Island.

The following works were received from Prof. Leopold de Buch, of Berlin:—Petrifactions Récuéilles en Amerique, par Alexandre de Humboldt et par Chas. Degenhart; Explication de deux planches de Spirifer et d'Orthis, par L. de B. Thanks of the society were voted, and the secretary directed to forward to the author a copy of the Geological Reports of this state.

Dr. Budd presented specimens of Succinea obliqua from New Jersey. Mr. Cummings exhibited a fossil fruit, found on this island, but supposed to be from the West Indies. Mr. Wheatley presented the following minerals and fossils:—Oolite, iron ore, magnetic iron ore, from Franklin county; iron pyrites, yellow ochre, tail of a trilobite, a spirifer, Leptæna depressa Terebratula, from localities in this state. Mr. Cozzens presented a number of specimens illustrative of the geology of the vicinity of Stony Point: he also read a notice of a fish taken in our waters, Coryphena perciformis, Mitchill, Palinurus perciformis of De Kay. Dr. Draper exhibited fossil elephant's teeth, from Wythe county, Va., and a shark's tooth from the same locality. Mr. Piggot exhibited a humming bird, and stated that he had a method of taming and feeding them; but did not wish to disclose his method until he had made further observations on their habits.

The London and Edinburgh Phil. Magazine, Nos. 106 and 107; Mag. of Nat. History, No. 43; Nat. History Illustrations, No. 4; Silliman's Journal, vol. 39, part i, and the American Repertory, No. 6—were laid before the Society.

Messrs. William Wheatley and J. P. Giraud were elected resident members.

August. The committee to whom were referred the fossil teeth presented by Dr. Draper, reported that they belong to the Elephas primogenus, and were the same as the one in the society's cabinet, from Kentucky. Mr. Wheatley presented specimens of the Potsdam sandstone from St. Regis river; Pandora trilineata, from the shores of Staten Island; bog iron ore investing clay stone, from Long Island; and Terebratula and Ammonites Loscombi, from the oolite of Oxford, England. A

collection of western shells were received from J. G. Anthony, Esq. of Cincinnati, embracing the following species:—Unio lachrymosus, rubiginosus, Schoolcraftensis, pliciferus, purpuratus, Tampicoensis and velum, Anodonta pavonia, Helix striatella, intertexta Planorbis corpulenta, concava, and Paludina Cincinnatiensis. Thanks of the society were voted to Mr. A. for his valuable donation.

Mr. Cozzens presented a series of rocks illustrative of the geology of Rhode Island. Dr. Swift, on behalf of Col. E. Clark, of Saugerties, presented four glow-worms? probably the larvæ of a coleopterous insect. The light afforded by these worms is much more intense than that given by the far-famed insect of Europe.

The Transactions of the Zoölogical Society of London, vol. ii, part 4; the Proceedings of the same Society, part 4, for 1836, and part 7, for 1839; Report of the Council for 1840—were received. Prof. C. U. Shepard presented Report on the Mineralogy of Connecticut. London and Edinburgh Phil. Magazine, No. 108; Magazine Nat. History, No. 44; Audubon's Birds of America, Nos. 14, 15 and 16—were laid before the society.

Dr. Charles A. Stedman, Oliver W. Gibbs, and G. Folsom, were elected resident members. B.

[For the American Repertory.]

ON THE STEAM-ENGINE.

(CONTINUED.)

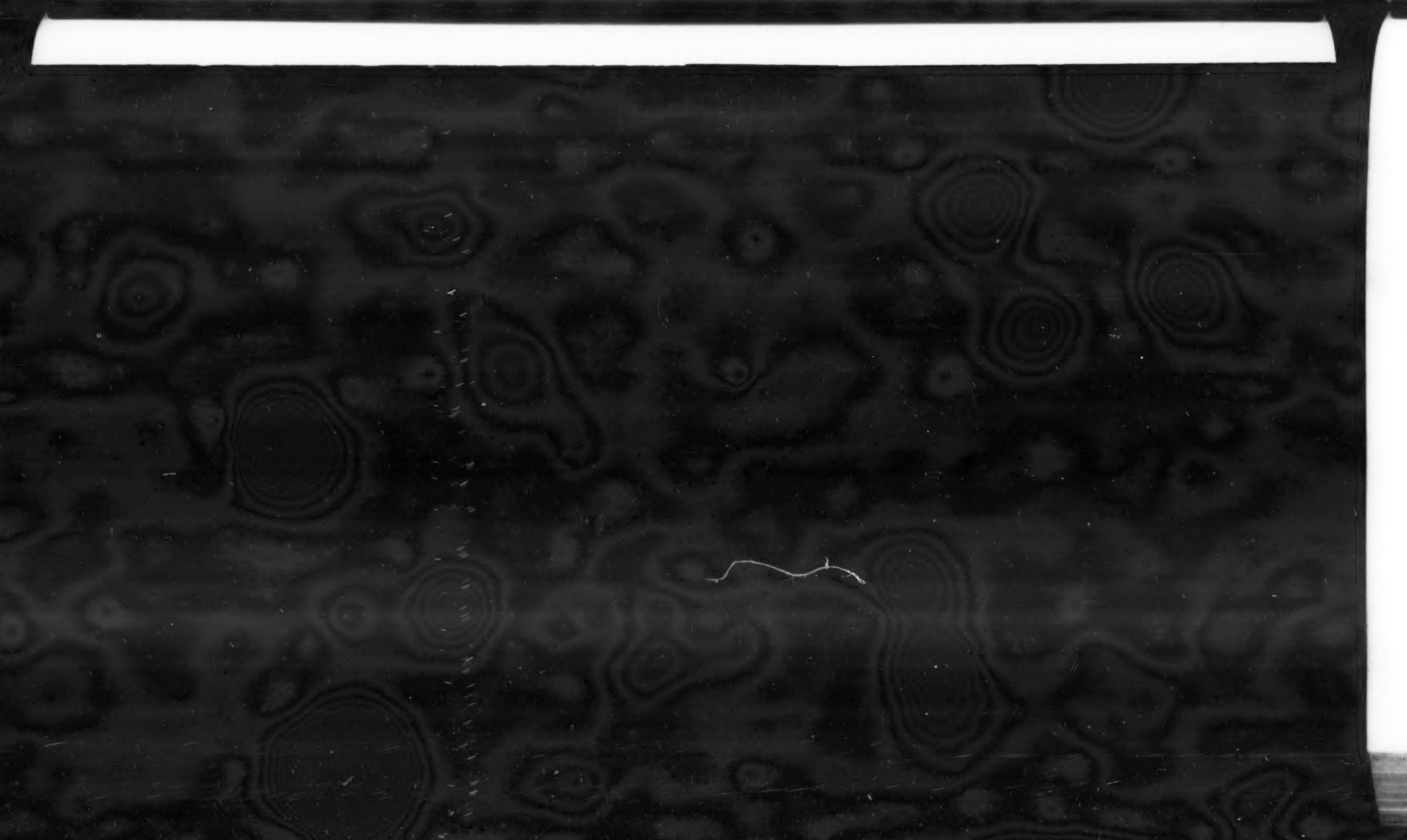
If your correspondent "J. E." had but recollected that 'a little learning is a dangerous thing,' he might have been spared the great discredit of his unscientific contradiction of us, when discussing and stating matters beyond either his observation or information; and he would also have been spared the far greater discredit of questioning our unimpeachable veracity at the very instant he was misrepresenting us. This must be apparent, on comparing our statements at page 415, vol. ii, with his at p. 33 of this volume, when it will plainly appear, we have based our calculations upon and arrived at our conclusion, from the numerous detailed advantages the North America possessed over

the Great Western, jointly, with the relative speed of the two vessels.

To combat our arguments, "J. E." has omitted all these great advantages, and adopted a mode of calculation different from all authorities—from truth—and, strangely enough, even from his own admissions. For at p. 32, he says our calculation is right; that the proportionate power required to propel steamers at different speeds, is as the squares of the velocities—or in other terms, that four times the power is required to obtain double speed; and at p. 33 he says in effect, the cube of the velocities is required, or eight times the power for double speed; and he thus contrives, by a mere quibble, to contradict us and himself, at the only time he accidentally happens to be right.

First, to extricate this matter from this utter confusion, we experimented with two model boats, of equal forms and weight, which were drawn through the water by cords passing over pulleys, to which cords different weights were appended. The speed, or space passed over by the respective boats in the same time, increased exactly as the weights were increased; for while one boat, drawn by a given weight, passed over a measured space, the other similar boat (drawn by a weight twice as heavy as the weight attached to the first boat) passed exactly over twice the measured space in the same time as the first boat. But as the double weight descended also to a double depth, it is evident four times the power was expended in drawing the second boat through a double space in the same time. But then the actual expenditure of power (or fuel) is evidently and really only double for traveling at double speed; because quadruple power evidently realizes not only double speed but double distance also. Hence, then, we are proved correct in our application of this law to the relative speed, distance, and power required respectively by the Great Western and North America.

Secondly, we experimented with a pair of paddle wheels, (the lower paddles only immersed in water as usual) to the axis of which a drum was attached, unto which a cord was wound, and the end of the cord passed over a pulley, was loaded successively with a different number of equal weights. These



weights, always elevated to the supporting pulley, were successively allowed to descend till all the cord was unwound from the drum, thus causing the paddle wheels to make each time a constant number of revolutions, while the time occupied by those revolutions was observed by the oscillations of a small pendulum. First a single weight was allowed to descend, and the number of vibrations noted; and next, a double weight, which was observed to descend in half the first number of oscillations, or in other words in half the time, a treble weight descended in one third the time, a quadruple weight descended in one fourth the time.

Thus again we see it proved that double velocity requires the expenditure of four times the power in the same time, because twice the weight descends in half the time to double the velocity of paddles. And we see that it is equally proved by each experiment, the speed of a boat increases exactly as the power, and the space passed over as the square of the power expended, or what is synonymous, the power required is as the square of the space passed over in equal times. All this we stated, and it is in accordance with what is commonly—we may say universally—believed, excepting by "J. E." who indulges in peculiar ideas on this subject, and just as discreditable to his discernment as was his impracticable contrivance to prove that heat was latent or insensible in steam, or not to be felt, and which absurd production then incontrovertibly proved the reverse of all his assertions, just as this analysis does that of his futile attempt to discredit our position.

Thus the statement which "J. E." at all hazards, attempted to discredit, remains unimpeached, namely, that the fuel in the low-pressure Great Western was twice as effective as the fuel in the high-pressure North America, and we supposed we were doing our duty when, in speaking this truth, bringing forward so important a fact for the general benefit of mankind, to realize an unalloyed blessing cheaply, from an expensive, useless, and bitter curse. For still, as it is to be remembered, the steam in the North America was used fully expansively, and the steam in the Great Western but little expansively; therefore an immensely greater comparative effect would be obtained from the

fuel in the latter vessel, were the steam used fully expansively therein. The obvious additional advantages of which we have previously detailed, and the correspondent additional and immense loss in the North America, must be equivalent.

The greater economy of employing steam of lower pressure expansively is evidently becoming more apparent (though much too slowly so) to the common sense of this community, while the boastful assertions of "J. E." that the use of steam was carried nearly to perfection in this country are exposed to the most glaring contradiction imaginable, when thus contrasted with 'facts.'

There are however too many significant tokens that the engineers generally do not believe his flattery, and we will name many more why they should not:

First, in the general war commenced against that inefficient contrivance, the throttle valve, by which the due expansion of steam was as generally as ineffectually attempted, and never accomplished, the authority of "J. E." to the contrary notwithstanding.

Secondly, by the gradual introduction and advantageous substitution of steam of lesser density, in all the most important later constructions, one of which, we shall presently show, is not a little curious.

Thirdly, by a very small circumstance in amount, but of great practical importance in its meaning; for we observe that boats having high-pressure engines are particularly advertised as of low pressure—at once proving the owners are much ashamed of the true characters of their boats, and the public, tired of longer submitting to a dangerous delusion miscalled scientific, and for no conceivable purpose whatever, either of speed, credit, economy or utility.

Thus these facts are not forgotten which we have detailed, and will engage to realize to their utmost extent, that low pressure steam, properly employed, is not only safe beyond all possible question or accident, but attainable at far less cost than half the cost of the dangerous and discreditable agent, that is now used solely from prejudice, and tolerated only from ignorance—from idly preferring theory to 'facts'—from parsimoni-

ously preferring insufficient engines to effectual ones—from the mistaken opinion that the ineffectual are less costly than the effectual; all which erroneous opinions we should long ere this (if uninterrupted) have shown to be contrary to reason and to 'facts.'

Were these facts but established, what an extensive field of scientific enterprise would be opened to the humane capitalist, who would so surely find that certain safety, greatest speed, lowest fares, durable machinery, lesser expenses, public patronage, and greatest profits, are all alike inseparable from real knowledge, an easy conscience, the honor of the nation, and the general good opinion of mankind.

Thus, while we have shown that no perceptible advantage resulted from the employment of high steam in the Cornish engines, in which steam of 26 lbs. per inch was shown to be as profitable and effectual as steam of 75 lbs. per inch. Thus, while we have been sincerely advocating the use of lower expansive steam to a degree hitherto unattempted, from the greater advantage which is so plainly evidenced in the diagram of the Great Western, and so fully confirmed by her performances, when fairly compared with the performances of the North America, by persons of competent education, and superior to vulgar or interested prejudices, and who can and will fairly calculate either of the two distinct data we furnished at p. 415, vol. ii; while fully aware how unpalatable such exposition was to the majority of our friends and acquaintances in this country, so strong is habit, so powerful is long cherished prejudice, so unwelcome is reform, in all times and in all places, however needful, and required here as it is, even for the credit of human nature itself; yet we find the rule is invariable, the first effect of proffered reform is ever offensive.

While we have thus almost hopelessly, without any encouragement, and under every discouragement, been declaiming against the extravagant use of high steam, long strokes, rapid strokes, and such paltry contrivances as throttle valves for expansion; while we have been endeavoring, above all things, to prove by 'facts' that high steam, which under every modification cannot but be dangerous, is and at all times a vastly un-

profitable delusion; thus hoping and endeavoring to engage the stronger incitement of interest, where (we blush to write it) the feebler impulse of humanity alone is forever unheeded, "J. E." has been opposing and thwarting us to the utmost of his powers —confirming the engineers in their unfounded, unprofitable, injurious and destructive prejudices, by flattering them with the perfection of their present system, contrary to 'facts.' For now, and without a blush, he exhibits the difference between his precepts and practice; for while contradicting us, he was at the same time engaged in constructing a pair of boat engines of the peculiar form so long ago patented by Cartwright, with cylinders 28 inches diameter, stroke 32 in., number of strokes per minute 42, greatest steam pressure on safety valve $7\frac{1}{2}$ lbs. per inch, steam cut-off $\frac{2}{3}$ stroke, but not by throttle valve as usual here; and having tried these engines, he is not a little proud of their performance, and as careless or insensible of his inconsistent public verbal praise as private practical reproof and contradiction of the general practice. That these engines are the most efficient portion of his outfit of the Clarion, we have experimentally ascertained by 'facts;' for not being able to conceive that any one-angled propeller, whatever and however bepraised, could by any possibility be equal in effect either to paddle-wheels, or to the screw of Archimedes, though so unequivocally and boldly asserted to be far superior to both by his humble admirer, in the article on Ericsson's Propeller, vol. ii; we have found our doubtful anticipations fully realized by an experimental investigation of the 'facts.' Having extended our apparatus so as to test the reality of the theoretical statements of those writers, we found all their assertions erroneous, and some to a degree that will soon appear truly astonishing; and as these matters are becoming even of national importance, it is of great consequence the public mind should be disabused by unprejudiced statements.

As we have no prejudices to gratify, no nostrums to puff or dispose of—as our greatest desire is to be useful, we shall proceed to detail our experiments, holding ourselves pledged to demonstrate the facts, whenever properly requested.

We provided a model boat, sharp built at each end, to which

a pair of paddle-wheels could be readily attached, and at any desired degree of immersion. We also provided various propellers, which could be attached at either end of the boat, and be made to urge the boat endways and either way at will. We also provided suitable drums to the arbors of paddle-wheels and propellers, of such respective dimensions, that a cord being wound on each drum, and the end thereof passed over a pulley, and a weight so suspended by the cord that the weights applied to each would descend an equal distance in an equal time, when attached to any of the different propellers or paddle wheels; thus insuring an equal amount of power to each and to every one, for a due comparison of their respective propelling properties, when subjected to and acted on by the only true criterion, the expenditure of equal power on each in equal times.

The propelling powers of each were also tested by the action of a graduated meter, constructed to test these as well as many other important matters relating to the actual effect of steam power when applied to navigation—all which matters, like these under consideration, as it would be very desirable to know more about, and to talk, argue and dispute about less, we shall hereafter communicate.

We select a few only of our experiments with this apparatus, to show how contrary to 'facts' are the lengthy studied representations of the writer on Ericsson's Propeller, and who, like his prototype "J. E." is profuse of science and of information he never possessed.

First, we tried the effect of various propellers, each acting in opposition to paddle-wheels, and found none equal in effect to the paddle-wheel but the Archimedean screw, and which exactly balanced the wheels in effect.

Secondly, we tried Ericsson's Propeller, and found it to be very inferior in effect to either the paddle-wheels or to the Archimedean screw; a result that will not nor can cause surprise to any competent person viewing both, as the whole surface of the Archimedean screw is at once acting, and equally and efficiently, while some considerable part of Ericsson's peculiar propeller is uselessly and therefore hurtfully employed, and all the propelling surfaces being of one angle, are unequal-

ized to the different diameters, as beautifully and correctly exemplified, and only realized in the screw of Archimedes.

Thirdly, we tested the actual efficiency of paddle-wheels at different degrees of immersion. As the admirer of "J. E." asserted that paddle-wheels unduly immersed lost an immense power thereby, extending to three-fourths of their total power, your intelligent readers will not be a little surprised when we inform them the effect of greater, even double immersion, of paddle-wheels, by experiment, is ever accompanied with an increase of power, instead of the enormous decrease stated by the humble admirer and learned advocate of Ericsson's Propeller, and who, adducing this idle dream as a scientific truth, substitutes fiction for 'facts.'

In the foregoing observations on propellers, we desire to be understood as not being opposed to their substitution for paddle wheels, when properly constructed. † †

[For the American Repertory.]

ON THE EFFECTS OF ARTS, TRADES, AND PROFESSIONS, AS WELL AS HABITS OF LIVING, ON HEALTH AND LONGEVITY.

No. X.

The THIRD CLASS of causes affecting health and longevity among artisans embraces *mineral molecules*, which, either in the form of vapor or minute disintegration, come in contact with various parts of the body, producing maladies and symptoms of a specific character. As mineral substances are employed very extensively in the arts, and as their use is constantly extending with the progress of discovery and the advancement of science, it will be necessary to enter somewhat in detail into the mode of their operation, their peculiar effects upon animal bodies, and the best means of guarding against their pernicious properties.

Mercury.—The uses of mercury and its various combinations are numerous. In the metallic state, it is employed in the reduction of the ores of gold and silver, the construction of barometers and thermometers, for fine anatomical injections, for

mercurial pneumatic cisterns, &c.; in a state of combination (with tin) it serves for silvering looking glasses, and for water gilding; amalgamated with gold and silver, for silver-plating copper; combined with copper, for taking impressions—with zinc, for facilitating the action of electrical machines—with sulphur, for coloring sealing wax and for preparing *oxide of chrome* —with nitric acid, it forms the match or priming powder for percussion caps of muskets, rifles, &c.: it is also employed for various other purposes in the arts. Now when we consider that in all these processes mercury is liable to be received into the system in that mode, viz. the form of vapor, by which the body can be most speedily brought under its poisonous influence, it certainly is a matter of no little consequence to ascertain what are its effects upon the animal economy, and how they are to be prevented, and when present, removed.

It has indeed been doubted by some whether any vapors do arise from mercury at the ordinary temperature of the atmosphere; but this can very easily be proved, by suspending a bit of gold in the mouth of a vial, the bottom of which is covered with a little mercury, for in a few minutes the gold will become amalgamated. The vapors thus discharged, as Christison has remarked, may produce the worst species of mercurialism, if they are diffused through an apartment insufficiently ventilated. It has been abundantly established, by the experiments of Schlopfer,* that mercurial vapor is rapidly absorbed through the lining membrane of the air-passages. Six grains of corrosive sublimate, in the form of solution, has thus been known to destroy a rabbit in five minutes; and when sublimed, its fatal effects are no less speedily fatal. The sublimation of 24 grains of the same preparation with the blowpipe produced painful constriction of the throat, with headache, sickness and vomiting in several medical students who were engaged in chemical experiments.† Where mercury has been introduced more gradually and in larger quantities into the system, it produces various morbid phenomena, such as protracted tumors,‡ severe ptyalism, gangrene and ulceration of the mouth and throat, palsy, a vari-

* Wibmer. Die Wirkung der Arzneimittel und Gifte, 3. 46.
† Christison on Poisons, p. 391. ‡ Hufeland's Journal, vol. 43.

ety of nervous and inflammatory affections in different parts of the body, protracted dysentery,* morbid sensibility to cold, &c. Indeed the effects of mercury on the animal body, are doubtless far more diversified than those of any other poison; for as it acts on a greater number of organs, we might expect its phenomena to be proportionately various.†

To show the facility with which quicksilver evaporates and combines not only with other metals but also with elastic gases and the atmosphere, as well as to illustrate its effects upon the animal system, we may refer to an occurrence which took place in 1810 on board a British man of war, the Triumph, which had received thirty tons of quicksilver, contained in leathern bags of fifty pounds each, that had been picked up on the shore at Cadiz, from the wreck of two Spanish line-of-battle ships, that had been recently lost. The mercury, it appears, was at first confined in bladders, the bladders in small barrels, and the barrels in boxes. But owing to the heat of the weather, and to the bladders having been wetted in their removal from the wreck, they soon decayed and burst, and although as much of it was collected as possible, and committed to proper casks, yet large quantities of it escaped into the crevices and recesses of the ship. Dr. Good states that the quicksilver that had escaped unnoticed sank into the bilge-water, became partially decomposed, and ascending soon after with the vapor of the water, emitted an intolerable stench, coated every metallic substance in the ship with a black hue, and at the same time a general affection of the mouth took place among the men and officers to such an extent that not less than 200 became severely salivated, and did not recover till the ship, being carried into Gibraltar, was docked, and cleaned to its lowest planks. This, however, is not altogether a correct statement of the matter. From a

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* Edin. Med. Essays, v. iv, 38.

† As our remarks in the present essay apply only to the morbid effects of mercury when introduced into the system in an unguarded, irregular and unusual manner, we trust we shall not be understood as condemning the medical use of this important article, when timely administered and with such precautions as the circumstances of the case may require. Employed in such a manner, there is not, in the opinion of the writer, a more valuable medicine in the whole *materia medica*, than some of the preparations of mercury.

detailed history of the occurrence, drawn up by Dr. Burnett, surgeon of the Mediterranean fleet,* we learn that most of the quicksilver was stored in the bread room; that the surgeon and purser, who slept in cabins adjoining the bread room, and into which the mercury freely flowed, were the first and most severely affected; and that after the ship was completely purified by ablution, and the bilge-water all removed, as well as the provisions, stores, &c. on re-stowing the hold some time afterwards, every man so employed, as well as those in the steward's room, were attacked with ptyalism, and during the ship's passage, and on her return to Cadiz, the fresh attacks were daily and numerous for two months or more. The effects of the mercurial atmosphere were not confined to the officers and men of the ship's company; for almost all the stock, consisting of sheep, pigs, goats, and poultry, died from it; mice, cats, dogs, and canary birds shared the same fate, though the food of the latter was kept in a bottle closely corked. Besides causing ptyalism, the mercurial vapor produced severe ulcerations of the mouth, partial paralysis in many instances, and bowel complaints; ulcers which had long been completely healed and left no cicatrix, broke out again, and put on a gangrenous appearance. The vapor was very deleterious to those who had any tendency to pulmonary complaints; three men died of phthisis pulmonalis, who had never complained or been on the sick list before they were saturated with mercury; and one man who had suffered from pneumonia, but was perfectly cured, and another who had never had any complaint of the lungs previously, were left behind at Gibraltar, laboring under confirmed phthisis. Two only died from ptyalism, gangrene having taken place in their cheeks and tongues; and in the case of a woman confined to the cockpit with a broken limb, not only were all the teeth lost, but many exfoliations took place from the upper and lower jaws. The decks of the ship were covered with a black powder, and every thing metallic on board the vessel was changed to the same hue. Those who slept on the orlop and lower decks, with the exception of the midshipmen, who were more on deck, suffered equally; while those on the upper deck were

* Johnson's Med. Chir. Review, vol. 4, part ii, p. 1011.

not so severely affected; and the men who lived and slept under the forecastle escaped with a slight affection of the gums. An opinion prevailed among some persons at the time these events occurred, that the effects were caused by the bread and other provisions having become impregnated with the mercury; and in consequence of this belief, 7940 lbs. of biscuit which remained on board the vessel were condemned as unserviceable, "from having quicksilver mixed with it." The occurrences, however, above related, which took place afterwards, sufficiently show that the phenomena were probably wholly due to the inhaling of mercury in a state of vapor.

Although mercury is usually received into the system in the form of vapor when employed in the arts, yet this is not always the case. It is well known that the peculiar effects of mercury may be experienced from its application to the skin, even when not deprived of the cuticle. Thus mercurial inunction is a common mode of introducing this medicine into the circulation, where there are objections to administer it by the mouth; and we have known ptyalism produced in 24 hours by violent friction with a compound of strong mercurial ointment, camphor and Cayenne pepper. Indeed, even without the aid of friction, mercurial action may be excited in the system by simply placing some of the preparations of mercury in contact with the skin, and ptyalism may be easily produced by immersing the body in a warm bath, formed with the proportion of an ounce of corrosive sublimate to 48 quarts of water, repeated at an interval of three days between each bath. Soon after the third bath, the specific effects generally begin to be manifested. Not long since we read an account in a newspaper of a sudden death having resulted from the application of a lotion to the head, containing corrosive sublimate; and Dr. Christison relates the case of a gentleman who employed a lotion containing half a drachm of corrosive sublimate in an ounce of rum, for the cure of rheumatism; this was rubbed on the part affected for several minutes, before going to bed; before the friction was ended, he felt the sensation of heat in the part, to which however he paid but little attention; during the night he was attacked with pain in the stomach, retching, and vomiting, and soon after with purging and tenesmus; in the morning he was found very weak,

and vomiting incessantly; the arm up to the shoulder was prodigiously swelled, red, and blistered; next day he complained of brassy taste and tenderness of the gums, and regular salivation soon succeeded.* Prof. Syme also relates a case where a solution of the nitrate was rubbed by mistake upon the hip and thigh, instead of camphorated oil. Intense pains immediately followed, and afterwards shivering; the urine was suppressed for five days without any insensibility, and during its suppression urea was detected in the blood; ptyalism appeared on the third day, became very profuse, and was followed by exfoliation of the alveolar portion of the lower jaw; but recovery, nevertheless, slowly took place.† Merely carrying mercurial preparations near the skin, without being actually in contact with it, has been known to induce the peculiar effects of the poison, as in a case related by Dr. Schule, a German physician, where, after death from excessive salivation, a small leathern bag was found hanging at the breast of the deceased, and containing a few drachms of mercury, which it was then discovered he had been in the habit of carrying for the last six years, as a protection against itch and vermin, and during that period had frequent occasion to renew the mercury.‡

We have already alluded to the morbid susceptibility to cold induced by mercury, owing doubtless to depression of the vital energy and organic actions, and consequently of the process of animal calorification. To sum up, we may add, in the language of Dr. Copland, persons long or habitually exposed to fumes of quicksilver, are generally affected with ulcerations of the mouth and fauces, painful or rheumatic affections of the periosteum, joints, limbs, and ligaments, particularly after exposure to cold; eruptions on the surface of the body, and all the affections to which the term pseudo-syphilis has been applied, as well as many of those which are denominated cachetic. The effects are altogether the same, though slower in their accession and progress, as those which result from a too long continued but not violent mercurial course.‖

* Christison on Poisons, p. 392. † Ed. Med. and Surg. Jour. vol. xliv, p. 26.

‡ Medizinisch-Chirurgische Zeitung, 1833, iv, 330.

‖ From experiments instituted by Caspard, it appears that the development of the

The workers in quicksilver mines, according to *Fallopius*, can scarcely endure the employment for three years; and according to *Etmüller*, become in four months subject to tremors, palsy, and vertigo. *Rammazini* remarks, that in some mines no man can work more than six hours at once; and he relates the case of an individual, who, after having been employed there for half a year, became so charged with mercury that he made a piece of brass white by touching it with his mouth or his finger. *Tozzius* states that the miners of quicksilver lost their teeth, and were subject to asthma. *Bernard de Jussieu*, in a memoir read to the Academy of Sciences in 1719, stated that in the mercurial mines of *Almaden*, in La Mancha, the free workmen, who were not restricted to the place, and were cleanly in their habits, had no other disease than a slight trembling; while the slaves, confined and dirty, were affected with swelling of the parotids, apthæ, salivation, pustules, scurvy, and considerable trembling.

As the shaking palsy, or the *tremblement metallique* of the French pathologists, is one of the most common affections produced by long continued exposure to the influence of mercury, it deserves perhaps a more particular notice. The best account is that given by Merat,* which we shall chiefly follow. The disease, which is almost but not altogether peculiar to these persons, generally approaches in a gradual manner, though sometimes it attacks suddenly, commencing with slight convulsive snatches, followed by agitations and tremors of the affected muscles, particularly those of the arms, which it first attacks. In a short time, if the patient continue at his work, the affection extends to the lower extremities, to the organs of speech, and to the whole body; and it becomes difficult, if not impossible, for the patient to walk, to speak, or to chew. All voluntary

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embryo in the eggs of birds, and of the amphibia snails and insects, is arrested and destroyed by the vapor or exhalations of this metal. Consonant with these results is the fact, vouched for by Von Helmont, Hoffmann, Baglivi, and Bremser, that water in which quicksilver has been boiled possesses anthelmintic properties. It is obvious that metals possess odors which are unpleasant to many of the lower animals. Is it owing to this circumstance that a dog, though ever so well trained, is reluctant to seize and carry a piece of gold? or that the anthelmintic properties of tin are in any measure owing to the effluvia which it gives off?

* Appendix to "Traite de la Colique Metallique," p. 275.

motions, such as carrying food to the mouth, are effected by several violent starts, and are consequently very difficult and painful; in short, the person affected is incapable of any avocations which require the least precision of muscular action. To this succeeds restlessness, falling out of the teeth, constipation or disorder of the bowels, a dry and brownish state of the skin, slight atonic convulsions, cephalalgia, delirium, great depression of the nervous powers and of the general health, in which state the patient may continue to live for several years. In many cases, however, where the person does not immediately quit work, there speedily result loss of memory, sleeplessness, delirium, and death. But fortunately, the nature of the affection disables the man from work, and he rests as a matter of necessity. There is however no colic, although flatus is present—neither is there any disorder of the respiration—nor, except in very old cases, no wasting or impaired digestion. The pulse is unusually slow. Copland remarks, that although it is chiefly long continued exposures to mercurial preparations which produce this affection, a single exposure to their fumes, even for a few hours, when they float in the air, may occasion it; the effect being both rapid and violent when their vapors are inhaled with the atmosphere, and act upon the extensive surface of the bronchial tubes and air-cells. This disease is generally curable; sometimes, however, it is incurable, and but seldom fatal. Three cases only of death by it are related by Merat, in one of which it was owing to profuse salivation and gangrene, in the others to marasmus. Those who are liable to the shaking palsy rarely suffer from salivation, though this appears to have been the case in some of the cases, as noted by Mr. Mitchill, among the mirror silverers of London.* This affection has been noticed among gilders and barometer makers, as well as miners, and it has occasionally been caused by mercurial friction. Dr. Christison relates a case where a barometer maker and one of his workmen were exposed one night during sleep to the vapors of mercury, from a pot, on a stove in which a fire had been accidentally kindled. They were both most severely affected: the latter with salivation, which caused the

* London Med. and Phys. Jour. 67. 394.

loss of all his teeth; the former, with shaking palsy, which lasted his whole life.

We may be permitted to hope that many generations may pass by before we shall enter extensively into the manufacture of those articles of taste and luxury which are produced at so great a sacrifice of human life and happiness. Men who are engaged in silvering mirrors in England and France, where the large manufacturers are established, are chiefly Italians, and are exposed both by inhalation and touch to the action of mercury oxygenized by the atmosphere. Few can bear the employment for a long period. Some work on alternate days, and many who attempt to work regularly are obliged from illness to be absent for weeks and months. In some few instances a man has been able to work for two or three hours a day, for several years, without suffering any other inconvenience than constant though slight trembling of the hands. The common effects are difficult enunciation, pain and constriction at the base of the chest, depraved taste, fetid breath, emaciation, debility, tremors, and salivation. The gums are often wasted, and the teeth let loose in their sockets. It would seem that the first impression is made on the nervous system, as the fingers and hands are generally the parts first disordered, though no one can doubt that the mercurial vapor is taken into the system through the mucous membrane of the air-passages.

Modes of Treatment and Prevention.—Although the medical treatment of mercurial affections does not come particularly within the scope of the present essay, yet a few remarks on this subject may not be inappropriate. In general, the intemperate habits of the workmen, affected by the oxides of mercury, render the treatment very difficult and uncertain, complicating the disease, and leading to fatal disorganizations. Copland remarks, that in recent cases leaving off the trade that occasioned it will alone produce a cure. In long continued or confirmed cases, benefit is obtained with much more difficulty, and when procured, the disorder is extremely apt to return after the slightest exposure to mercurial fumes. De Haen prescribed electricity; Lettson recommended sulphur, and Copland thinks its effects are very decidedly favorable, yet in the cases which

occurred on board the Triumph it produced no alleviation of the symptoms, although given in large quantities; on the contrary, Dr. Burnett says, it greatly augmented the bowel complaints with which many of the patients were affected, and brought on a very severe tenesmus. The only plan which produced effectual relief was removal from the ship, with the frequent use of small doses of neutral salts and detergent gargles. Mr. Pearson, of London, relied chiefly on exposure to a dry and open air. Sementini states that he obtained uniform advantage from the use of nitrate of silver, beginning with an eighth of a grain, and gradually increasing the dose to three grains in the day. Iodine has also been prescribed with success in these cases.

The prophylactic measures are simple, though not always of easy application. Cleanliness is of the first importance, as appears from the statement of Jussieu, that the free workmen in the large quicksilver mines of Almaden, who took care to change their whole dress, and attended to cleanliness, were but little affected by their occupation; while the slaves, who could not afford a change of raiment, but took their meals in the mine without ablutions, were subject to swellings of the parotids, apthous sore throat, salivations, eruptions, and tremors.*

Where it can be avoided, the amalgams should never be touched with the naked hand, and the whole body should frequently be washed, and the hands and face always before taking a meal. Where the mercury is volatilized by heat, it is indispensable that the current of air up the flue should be sufficiently strong to carry the fumes effectually out of the building, otherwise the most serious consequences might result.

Water gilders, when employed on small work, are in the practice of interposing glass between the mouth and the materials; and when engaged on larger articles, of affixing to the mouth and nose a kind of proboscis, which hanging down, opens at a distance from the source of the mercurial fumes. The workshops should be so constructed that currents of air can be maintained through them: a good plan would be to have the doors and windows opposite to each other, which should gene-

* Mem. de l'Acad. des Sciences, 1719, p. 474.

rally be kept open, and thus a free circulation of air secured. It has also been suggested that the workmen should have a piece of gold applied to the roof of the mouth while at work, which might thus attract and intercept the mercury when drawn in with the breath. When it grows white, it may be readily cleaned by holding it a short time in the fire, which causes the mercury to evaporate.

Mercury in Kyanized Timber.—It has lately been discovered in England (as stated in the last number of the Repertory) by Mr. Kyan, that wood may be preserved from dry-rot and the destructive attacks of insects, by saturating it thoroughly by long immersion with a solution of *corrosive sublimate*, in the proportion of 2 lbs. of sublimate to 100 measures of water. As this process may perhaps be introduced into this country, we shall give the substance of some remarks which we find in the April number of the British and Foreign Medical Review, p. 532, on this subject:

1. From the ready absorption of this poisonous liquid through the skin, the mere manipulation of the timber exposes the workmen to much danger. They should be warned not to dip their hands in the liquid more than can be avoided. They should wear linen, which ought to be frequently washed; the water used in washing either their persons or their linen should have *muriate of ammonia* dissolved in it, so as to precipitate and separate the poison more effectually. Lastly, the earth on which any of the poisonous liquid may fall, should after a time be dug up and buried in a deep hole.

2. As a matter of medical police, it is proper to inquire whether, under certain circumstances, mercury may not be volatilized from wood thus prepared, and produce its usual dangerous effects upon those exposed to the vapor. The occurrence of prejudicial effects from this cause, says Dr. Schweig, of Carlsruhe, has been denied, because the crews of vessels built of Kyanized timber have returned healthy, after long voyages, even in tropical latitudes. Where there is a free access of air, as in the wood used in railways (sleepers) no danger from this source is to be apprehended; but when the wood is employed in the construction of close apartments, in damp or ill ventilated

places, the case is different. Experience may not have hitherto shown that dangerous consequences have followed; but if there be reason to suspect the possible occurrence of these on physical grounds, this is sufficient to justify a government in interfering to prevent the use of such timber for the construction of houses.

3. Wood thus impregnated with corrosive sublimate is wholly unfitted for the making of vessels to hold articles of food or drink, either for the use of man or animals.

4. Kyanized wood can never be safely employed for fuel, like common wood, as the mercury contained in it would be volatilized, and conveyed in the form of vapor through the apartments of a house, leading unavoidably to illness, if not the slow destruction of life by the poison. It might possibly be safely burned in a close stove, with a good draught; but after all, the practice would be hazardous. The chips and cuttings of Kyanized wood should be destroyed in the open air, and not allowed to be employed for fuel by those engaged in working the timber or by others.

The writer above quoted thinks that some precautions should be taken by the government in allowing the application of this process, and that it is a duty to ascertain whether some harmless substitute, equally preservative, may not be found for the deadly drug at present used; and suggests that copper* might be thus employed. This mineral, he remarks, effects the same chemical changes on the soluble principles of wood as corrosive sublimate; and although, being a poison, the wood cannot be used for the manufacture of domestic utensils, yet the metal copper is fixed, and when the wood after use is burnt, there is no fear of its giving out poisonous vapors. This fact would render its employment safe in the construction of houses, or in building for the use of man and animals. Dr. S. concludes his remarks by suggesting whether government should not prohibit the employment of corrosive sublimate in the preservation of

* Sir William Burnett has lately discovered that *chloride of zinc* is greatly superior to both mercury and copper for the preservation of wood, as well as of sailcloth and cordage. He has patented the process in England, and it is now almost entirely superseding the more dangerous process of Mr. Kyan in Great Britain. It is almost needless to state that this preparation contains no poisonous qualities.

timber, and recommending as a substitute a solution of the sulphate of copper.

We are not aware that Kyanized timber is likely to come into extensive use in this country: if it should, we have no doubt it would lead to frequent cases of poisoning, not only in consequence of the fragments of wood being used for fuel, but also from its being ignorantly used in the construction of tubs, barrels, cisterns, spouts, for the holding of water, milk, and other fluids. Should such timber, however, be very generally employed, we think the suggestions of Dr. S. well worthy the attention of our own government.*

GILDING BY GALVANISM.

In the September number of the Repertory we gave the process of gilding by precipitation, as applied by M. de la Rive, of Geneva; but it has since been considered by some that the coating of gold being so slight that it could never be of much value to the arts and trades; this, we believe, has now been satisfactorily tested.

Professor Wyatt, of Philadelphia, author of several valuable works on various branches of science, has exhibited to us a copy of an ancient medal first formed by the electrotype, and then splendidly gilded by this process. It has the appearance of rich gold; and after being carried in the pocket for three weeks, retains its solidity and brilliancy. We have carefully compared it with one gilded by heat, and it has the preference in appearance, and appears to be equally lasting. If this process should turn out as it appears at present, it will be invaluable to the arts and trades; articles can be gilded for one-tenth the usual price, and the exposure to the mercurial vapor, so injurious to health, obviated.

The apparatus used by Prof. W. differs but little from the

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* From a paper lately read before the Horticultural Society of London, we learn that from numerous experiments made by Mr. Fountain, on growing plants in frames and houses built of Kyanized wood, such wood is highly injurious to vegetation in a warm, moist atmosphere, and should therefore be only used when well painted over, and placed in a low temperature with little moisture.

one used by Dr. Chilton, and described in the July number of this work, and the process similar to that of M. de la Rive, with the exception that the solutions should be used warm, and fine gold without alloy used: the higher the polish on the object to be gilded, the richer and thicker the coating of gold will be.

NATIONAL ACADEMY OF DESIGN.

This useful institution has opened its 16th annual exhibition, and we are happy to say that its rooms have been literally crowded with visitors.

The walls are graced with 124 compositions, 35 landscapes, 132 portraits, and 82 miniatures, in addition to which are 19 specimens of sculpture. Many of the portraits and miniatures might fairly be classed as compositions, from the variety of their accessaries, action and peculiar positions of the figures.

The general improvement of our artists is too manifest to be mistaken, and in no particular more so than in the classic positions and arrangements in the portraits; the eye is no longer annoyed with precisely three-quarters of every figure and face, and with an eternal sameness of back grounds.

There are very few poor pictures in the exhibition, (some are positively necessary to enable young artists to discover their faults by close comparison with better works) and visitors are fully repaid by the larger number of compositions of the first class, which alone would form a better collection than we have ever seen before in this city.

We again feel it a duty to find fault with some of the criticisms which have already appeared in our city papers. It is morally wrong for those unacquainted with the arts to meddle with the fame of artists, their emolument is so closely connected with the popularity of their works, that the author of unjust and unmerited fault-findings should be subject to a suit at law as much as he who would injure the credit of a merchant. This we believe and say only of *pretenders* to critical acumen, for "no true artist deprecates a *just* criticism. However sensitive he may be, and however keenly he may feel a censure, he will

thank the hand that deals it to him, if the criticism be made in the spirit of genuine love for art."

The exhibition opened so much later than was anticipated, that our review for this number will be necessarily brief.

Our readers are well aware that the arts of design and their useful applications have been constantly kept before them. The present exhibition offers a good opportunity to those engaged in the mechanic arts, who wish to cultivate a classical taste; and as an incentive to exertion, we would advise them to examine the truly artistical designs exhibited at the show rooms of Storr & Mortimer, in Broadway; they will then perceive the advantage possessed by those artisans who have diligently studied the arts of design over such as copy those forms only which are merely required for useful purposes. The arts of design are as necessary to our success as a manufacturing country, as education is to insure civilization; and until we can produce elegant as well as useful products, we must ever expect to find a preference given to foreign manufactures.

No. 1. *The Happy Valley, from Rasselas, the Prince meditating his escape; by Jesse Talbot.* It is our misfortune to be forced in the very commencement of the critique to find fault. This picture has many beauties; the atmosphere is good, but the whole so strongly tinctured with plagiarisms, that it should not be permitted to pass without comment. The trees are from Turner, and other less important parts from other masters. An artist does well to imbue his mind with the works of good masters, and can do so without being at all liable to the charge of borrowing either style or matter; but when he compounds a picture, and sends it forth as original, we cannot quietly pass it by unnoticed. Mr. Talbot has talent, and with a close observance of nature may yet surprise himself.

3. *Canute Reproving his Courtiers; by E. M. Brown.* This composition is very faulty, and has the usual fault of unstudied compositions—bad drawing.

6. *Portrait of a Lady; by J. Burns.* An apotheosis of a gown fresh from the dressmaker's.

7. *Portrait of a Gentleman; by J. Burns.* An ambitious attempt of a tyro without the ability to perform. If young artists

would content themselves with painting simple portraits, with such accessaries as they might be expected to succeed with, instead of such as require years of practice and strong talents to manage, they would more surely and rapidly succeed.

8. *Portrait of a Gentleman; by H. P. Gray.* This is unequivocally a good picture, but suffers from bad varnish.

9. *View on the Hudson, looking down from Poughkeepsie—morning; by W. J. Jewitt.* Well managed, except the clouds in the distance, which more resemble the smoke from a burning meadow than the effect intended.

10. *Group of Children; by H. Inman, N. A.* The middle head is extremely good; but we cannot uneerstand why Mr. Inman should give his consent to exhibiting this picture, when he has so many other and better pictures in the exhibition.

11. *"The one shall be taken and the other left;" by C. Verbryck, A.* For sale.

12. *Saul and the Witch of Endor; by A. D. O. Browere.* Why will the Academy admit such pictures? There can be no sufficient reason for admitting an attempt so void of merit. The Witch really appears more frightened than the bystanders.

ERICSSON'S PROPELLER—A TALK TO CORRESPONDENTS, &c.

We regret that the writer "On the Steam-Engine," whose papers are in course of publication in our pages, should, in his eager pursuit after truth, have been led into erroneous suppositions and statements respecting a recent invention, the Ericsson Propeller, which he has chosen to interweave with the professed subject of his investigations. It was not an uncertain trust to suppose that the descriptions of this Propeller that have appeared in the journals of the day (ours among the number) and in other forms, would have prevented any misapprehension as to its principle and construction in the mind of the scientific reader. Such, however, appears not to have been the case; and we are therefore called upon to interpose between a meritorious invention and possible harm, by briefly recapitulating its

prominent characteristics, promising to give at an early day a full description of it, with drawings.

Our correspondent, in speaking of the Ericsson Propeller, and in the deductions he draws as to its efficiency, has supposed its propelling surfaces to be of *one angle* (pp. 268, 269.) This is altogether a mistake; for these surfaces consist of *a series of* SPIRAL *or winding planes, so formed that the* PROGRESSIVE *movement through the water is alike in every part;* or in other words, the angle of these planes formed with the axis is less towards the centre than at the periphery, by which the *forward* motion of every point in their surfaces will be alike, although the *rotary* motion varies as the distances from the centre; and hence it becomes evident that the whole of the surface of the planes will be constantly tending to propel, no part being inactive, as our correspondent supposes. What was the precise form of the propeller with which he made the experiments that resulted so unfavorably, we cannot divine; but we are satisfied that it did not bear the slightest analogy in principle to the Ericsson Propeller. We shall content ourselves with merely dissenting from his peculiar views upon the immersion of paddle-wheels and some of the laws of physics, although intimately connected with the above explanation.

While we are 'i' the vein,' a word to correspondents in general;—a brief discourse that we should have held long since, but that we hate sermonizing—out of canonicals. When first the fates transformed an inemerited good fellow into a grim guardian of controversial proprieties—when the incarnation of fun, as the wits at 'Poet's Corner' were pleased to term it, became the breathing vesture of that awe-inspiring majesty shadowed forth under an editorial plurality—we laid down for our government a rule of conduct, some features of which it is fit we should apprise our esteemed correspondents.

Firstly, then, we cannot exclude from the pages of the Repertory any arguments consonant with the spirit of the work, except such as would be an insult to the intelligence of its readers. In all time there have been found lights in science who entertained opinions opposed to those held by their cotemporaries, and often

to truth. Happily an editor is not identified with every crudity he may usher into the world, and it is this exemption alone that renders his office supportable.

Again. While with the arguments we have nought to do, it will be our especial province to see that they do not appear in a discourteous garb; though if correspondents are wise, the exercise of this duty will never be called for; rest assured that all unprejudiced readers unhesitatingly believe that combatant to be in the wrong who deals in personalities, or in any other way lays aside the exterior of civility and courtesy.

MONTHLY RECORD.

Steel Ore.—The recently discovered mine of steel ore, in Franklin county of this state, of which we gave some account in a preceding number of the Repertory, has attracted the attention of the Legislature, who by resolution a short time since called for information respecting it. Prof. Emmons, of the state geological corps, has in answer submitted a report, which fully confirms, if confirmation were needed, the favorable opinion before expressed. A full republication of this report in our pages is not necessary, as much of it is in effect but a repetition of what they already contain upon the subject: we have therefore merely extracted a scientific description of the new mineral, and the conclusions arrived at by Professor Emmons respecting its value.

In this state we have at least six different species or kinds of iron ore, each of which occupies different geological positions:—1. Magnetic oxide of the primary rocks.—2. Hematites or brown oxides of the slates and slaty limestones, as in Columbia and Dutchess counties.—3. Specular oxide of St. Lawrence county, at the junction of the primary with transition.—4. Argillaceous oxide of the western counties in the middle portion of the transition.—5. Carbonate of iron which is found associated with the specular.—6. Bog ores formed in alluvions. Two of these different kinds—the magnetic and the carbonate—have been called steel ores, inasmuch as they are susceptible of being converted into steel without passing through the process of cementation. The cause of this difference in the ores is to be ascribed to the fact that the carbon with which the ore comes in contact during the process of reduction, combines chemically with the iron, forming a true carburet. In instances

in which steel cannot be formed in this process, a mixture of carbon or carburet of iron is the result, which destroys the cohesion of the parts.

In conclusion, I beg leave to offer the following remarks:

1. Edge tools made from the Duane ore differ in two particulars from those made of ordinary cast iron: first, in not crumbling along the edge when ground; and 2d, in carrying a *feather* edge.

2. The change from cast iron to steel takes place during the process of tempering, as is evident from inspection: the portion of the tool which is not tempered is of a dark gray, while that which has been submitted to this process is light gray, and of a finer grain.

3. The principal reason why several mechanics in this city have expressed unfavorable opinions of this steel, is owing to the fact that the tools which were put into their hands were not properly tempered. It was owing to this circumstance that my own opinion was also unfavorable.

4. This subject becomes more important when we consider that many other deposits of ore in the north will probably furnish equally satisfactory results.

5. In one respect the casting of tools in the Duane process has an advantage over the cast steel; it does not injure the material by frequent tempering and working; whereas, the more cast steel is worked the more it deteriorates.

6. The Duane metal may be hammered and flattened without breaking, at a low red heat, which may be useful in giving greater strength and compactness to a tool.

7. The process to which the Duane metal was submitted at the Troy nail factory must be considered as a very successful experiment, proving the ability of the ore of being converted into the softest malleable iron, suitable for nail rods and other uses where softness and toughness are desirable properties; for I hope very few are so ignorant as not to know that the process of puddling is the true one for making the best malleable iron, and no one could suppose that steel could by any means have been made in this mode. This process would have perfectly converted the best of steel to iron, by being decarbonized during its exposure in the furnace.

Legislative Proceedings.—The bill for the promotion of agriculture, of which we made mention in the last number, was amended in the Senate so as to give to the American Institute alone that proportion of the fund belonging to this county, coupled with the condition that an equal sum be appropriated by the Institute, and the whole devoted to the furtherance of agriculture.

New Clock.—There is now on exhibition at the rooms of the American Institute, a time-piece, constructed upon the plan described at page 294 of the present number.

MISCELLANEOUS.

DOMESTIC.

Laura Bridgman.—The last annual report of the Perkins Institution for the Blind contains a full account, which has been prepared by the director, Dr. Howe, of that most remarkable being, Laura Bridgman—a girl who is wholly deaf, dumb and blind, almost if not quite destitute of the power of smell, and has but a very faint and imperfect sense of taste. Of course, the only remaining organ of communication between her mind and the world is the sense of touch, of which so little use is commonly made in the acquisition of knowledge. Her story is full of instruction and pathos. Common School Journal.

Laura Bridgman has become extensively known. Human sympathies are always ready to be poured out in proportion to the amount of human suffering. The privation of any one sense is supposed to be a dreadful calamity, and calls at once for our sympathy with the sufferer; but when a human being is known to be deaf, dumb, blind, without smell, and with imperfect taste, that being excites the tender compassion of all who feel, and becomes an object of great curiosity to those who reflect as well as feel. When the supposed sufferer is a child—a girl—and of pleasing appearance, the sympathy and the interest are naturally increased.

Such is the case with our beloved pupil, Laura Bridgman; and so general is the interest which she has excited, and so numerous are the inquiries concerning her, that I have thought it would be showing proper respect to the public of this section of the country to publish a short history of her case.

She was born in Hanover, New Hampshire, the 21st of December, 1829. She is described as having been a very pretty and sprightly infant, with bright blue eyes. She was, however, so puny and feeble until she was a year and a half old, that her parents hardly hoped to rear her. She was subject to severe fits, which seemed to rack her frame almost beyond its powers of endurance, and life was held by the feeblest tenure; but when a year and a half old, she seemed to rally, the dangerous symptoms subsided, and at twenty months old she was perfectly well.

Then her mental powers, hitherto stinted in their growth, rapidly developed themselves; and during the four months of health which she enjoyed, she appears (making due allowance for a fond mother's account) to have displayed a considerable degree of intelligence.

But suddenly she sickened again; her disease raged with great violence during five weeks, when her eyes and ears were inflamed, suppurated, and their contents were discharged. But though sight and hearing were gone for ever, the poor child's sufferings were not ended; the fever raged during seven weeks; "for five months she was kept in bed, in a darkened room; it was a year before she could walk unsup-

ported, and two years before she could sit up all day." It was now observed that her sense of smell was almost entirely destroyed, and consequently that her taste was much blunted.

It was not until four years of age that the poor child's bodily health seemed restored, and she was able to enter upon her apprenticeship of life and the world.

But what a situation was hers! The darkness and silence of the tomb were around her; no mother's smile called forth her answering smile; no father's voice taught her to imitate his sounds; to her, brothers and sisters were but forms of matter which resisted her touch, but which differed not from the furniture of the house save in warmth and in the power of locomotion; and not even in these respects from the dog and cat.

But the immortal spirit which had been implanted within her could not die, nor be maimed nor mutilated; and though most of its avenues of communication with the world were cut off, it began to manifest itself through the others. As soon as she could walk she began to explore the room, and then the house; she became familiar with the form, density, weight and heat of every article she could lay her hands upon. She followed her mother, and felt of her hands and arms, as she was occupied about the house, and her disposition to imitate led her to repeat everything. She even learned to sew a little and to knit.

Her affections, too, began to expand, and seemed to be lavished upon the members of her family with peculiar force.

But the means of communication with her were very limited; she could only be told to go to a place by being pushed, or to come to one by a sign of drawing her. Patting her gently on the head signified approbation; on the back, disapprobation.

She showed every disposition to learn, and manifestly began to use a natural language of her own; she had a sign to express her idea of each member of the family, as drawing her fingers down each side of her face, to allude to the whiskers of one; twirling her hand around, in imitation of the motion of a spinning wheel, for another, and so on. But although she received all the aid that a kind mother could bestow, she soon began to give proof of the importance of language to the development of human character. By the time Laura was seven years old the moral effects of her privation began to appear. There was nothing to control her will but the absolute power of another, and humanity revolts at this. She had already begun to disregard all but the sterner nature of her father, and it was evident that as the propensities should increase with her physical growth, so would the difficulty of restraining them increase.

The parents were easily induced to consent to her coming to Boston, and on the 4th of October, 1837, they brought her to the institution.

For a while she was much bewildered; and after waiting about two weeks, until she became acquainted with the new locality, and somewhat familiar with the inmates, the attempt was made to give her a knowledge of arbitrary signs, by which she could interchange thoughts with others.

There was one of two ways to be adopted; either to go on to build up a language of signs on the basis of the natural language which she had already commenced herself, or to teach her the purely arbitrary

language in common use; that is, to give her a sign for every individual thing, or to give her a knowledge of letters, by a combination of which she might express her idea of existence, and the mode and condition of existence of anything. The former would have been easy, but very ineffectual; the latter seemed very difficult, but if accomplished very effectual; I determined to try the latter.

The first experiments were made by taking articles in common use, such as knives, forks, spoons, keys, &c. and pasting upon them labels with their names printed in raised letters. These she felt very carefully, and soon of course distinguished that the crooked lines *spoon* differed as much from the crooked lines *key* as the spoon differed from the key in form.

Then small detached labels, with the same words printed upon them, were put into her hands; and she soon observed that they were similar to the ones pasted on the articles. She showed her perception of this similarity by laying the label *key* upon the key, and label *spoon* upon the spoon. She was encouraged here by the natural sign of approbation, patting on the head.

The same process was then repeated with all the articles which she could handle; and she very easily learned to place the proper labels upon them. It was evident, however, that the only intellectual exercise was that of imitation and memory. She recollected that the label *book* was placed upon a book, and she repeated the process, first from imitation, next from memory, with only the motive of love of approbation, but apparently without the intellectual perception of any relation between the things.

After a while, instead of labels, the individual letters were given to her on detached bits of paper; they were arranged side by side, so as to spell *book*, *key*, &c. when they were mixed up in a heap, and a sign was made for her to arrange them herself so as to express the words book, key, &c. and she did so.

Hitherto the process had been mechanical, and the success about as great as teaching a very knowing dog a variety of tricks. The poor child had sat in mute amazement, and patiently imitated every thing her teacher did; but now the truth began to flash upon her—her intellect began to work—she perceived that there was a way by which she could herself make up a sign of anything that was in her own mind, and show it to another mind; and at once her countenance lighted up with a human expression; it was no longer a dog or parrot, it was an immortal spirit eagerly seizing upon a new link of union with other spirits! I could almost fix upon the moment when this truth dawned upon her mind, and spread its light upon her counternance; I saw that the great obstacle was overcome, and that henceforward nothing but patient and persevering but plain and straightforward efforts were to be used.

The result thus far is quickly related and easily conceived; but not so was the process; for many weeks of apparently unprofitable labor was passed before it was effected.

When it was said above that a sign was made, it was intended to say that the action was performed by her teacher, she feeling of his hands and then imitating the motion.

The next step was to procure a set of metal types, with the different

letters of the alphabet cast upon their ends; also a board in which were square holes, into which holes she could set the types, so that the letters on the ends could alone be above the surface.

Then on any article being handed to her, for instance a pencil or a watch, she would select the competent letters, and arrange them on her board, and read them with apparent pleasure.

She was exercised for several weeks in this way, until her vocabulary became extensive; and then the important step was taken of teaching her how to represent the different letters by the position of her fingers, instead of the cumbrous apparatus of the board and types. She accomplished this speedily and easily, for her intellect had begun to work in aid of her teacher, and her progress was rapid.

The whole of the succeeding year was passed in gratifying her eager inquiries for the name of every object which she could possibly handle —in exercising her in the use of her manual alphabet—in extending in every possible way her knowledge of the physical relations of things, and in proper care of her health.

At the end of the year a report of her case was made, from which the following is an extract:

"It has been ascertained beyond the possibility of doubt that she cannot see a ray of light, cannot hear the least sound, and never exercises her sense of smell if she has any. Thus her mind dwells in darkness and stillness as profound as that of a closed tomb at midnight. Of beautiful sights, and sweet sounds, and pleasant odors, she has no conception; nevertheless, she seems as happy and playful as a bird or a lamb; and the employment of her intellectual faculties, or the acquirement of a new idea, gives her a vivid pleasure, which is plainly marked in her expressive features. She never seems to repine, but has all the buoyancy and gayety of childhood. She is fond of fun and frolic, and when playing with the rest of the children, her shrill laugh sounds loudest of the group.

"When left alone, she seems very happy if she has her knitting or sewing, and will busy herself for hours; if she has no occupation, she evidently amuses herself by imaginary dialogues, or by recalling past impressions; she counts with her fingers or spells out names of things which she has recently learned in the manual alphabet of the deaf mutes. In this lonely self-communion she seems to reason, reflect, and argue; if she spells a word wrong with the fingers of her right hand, she instantly strikes it with her left, as her teacher does, in sign of disapprobation; if right, then she pats herself on the head and looks pleased. She sometimes purposely spells a word wrong with the left hand, looks roguish for a moment and laughs, and then with the right hand strikes the left as if to correct it.

"During the year she has attained great dexterity in the use of the manual alphabet of the deaf mutes, and she spells out the words and sentences which she knows so fast and so deftly, that only those accustomed to this language can follow with the eye the rapid motions of her fingers.

"But wonderful as is the rapidity with which she writes her thoughts upon the air, still more so is the ease and accuracy with which she reads the words thus written by another, grasping their hands in hers, and

following every movement of their fingers, as letter after letter conveys their meaning to her mind. It is in this way that she converses with her blind playmates; and nothing can more forcibly show the power of mind in forcing matter to its purpose, than a meeting between them. For if great talent and skill are necessary for two pantomimes to paint their thoughts and feelings by the movements of the body and the expression of the countenance, how much greater the difficulty when darkness shrouds them both, and one of them can hear no sound!

"When Laura is walking through a passage way with her hands spread before her, she knows instantly every one she meets, and passes them with a sign of recognition; and if it be a girl of her own age, and especially if one of her favorites, there is instantly a bright smile of recognition, and a twining of arms, a grasping of hands, and a swift telegraphing upon the tiny fingers, whose rapid evolutions convey the thoughts and feelings from the outposts of one mind to those of the other. There are questions and answers, exchanges of joy or sorrow, there are kissings and partings, just as between little children with all their senses."

Ocean Steam Navigation.—We learn from the Commercial Advertiser of this city that contracts for building two of the four proposed American steamships have been signed, the models are completed, and the timber procured. The builders are Messrs. Smith, Dimon & Comstock, well known as excellent naval architects. The ships are to be 2500 tons each, and three hundred feet in length. Each is to have two engines of 100 horse power—equivalent to 1040 horse power according to English computation. The two are to be finished in eighteen months, and as soon as they are completed, the keels of the other two are to be laid. They are to make the passage from New-York to England in ten days average—that is, the time allowed for the passage, under ordinary circumstances, is to be ten days, while, if favored by wind and weather, the ships are expected to make the run in nine, or less perhaps; of course when the circumstances are unpropitious, the run may be protracted to twelve or thirteen days.

The negotiations with the government of the United States for carrying the mail, are not yet concluded, nor are they suspended. It is not unlikely that a favorable arrangement will be made to this effect, but whether it is or not, the ships will be built, will commence running between New-York and England.

It is in contemplation also to increase Cunard's line of Atlantic steamers so that one will leave England every week. Every alternate steamship will touch at New-York and the other half at Boston as usual. A steamship will start regularly for New-York once every two weeks. Cunard's steamers are to connect with those now building to run to the West-Indies. N. Y. paper.

Strange Bird.—A rare specimen of the feathered tribe, from the impetuosity of the weather, was driven into a neighbor's cellar a day or two since. He is about the size of a partridge, has a black plumage—very delicately formed neck and head; his beak is tipped with green, and from about midway of which to the crown of his head, he has a thick, red covering of skin, half-diamond shaped. His legs are

long and well calculated for wading. The hospitalities of his captors were extended in various ways, and when meal time arrived he concluded to "take his fish rare."

Goodrich's Natural History furnishes no like specimen—and being without any extensive work on ornithology the bird is likely to live among entire strangers without a name. Le Roy, (Gen. Co.) Gazette.

Preservative Property of Alum.—The body of General Wayne, who died 30 or 40 years ago, at Erie, Pa. and was buried near the Lake, was recently disinterred and removed by his son, and was found to be in a perfect state of preservation. Those who had known General Wayne, recognised his features at once. This extraordinary preservation is accounted for in Silliman's Journal, by the fact that the body had been buried in an argillaceous soil strongly impregnated with a solution of alum. Signal.

New Era in Time Keeping.—This is scarcely too much to say of the introduction of the TWELVE MONTH'S CLOCK of our ingenious townsman, Mr. AARON D. CRANE, of which we have already published several notices. A beautiful, well finished model has been quietly measuring the time for us at our desk, for the last twenty-four hours, as silently as possible, except as it announces the hours, and we feel confirmed in the impression that it is destined to supersede all other clocks now in use. The machine may be as well adjusted to run two years without winding as one. It is in fact the nearest approach to perpetual motion that we have seen. An ingenious friend has furnished us with a brief sketch of it.

The clock contains only six wheels of from 60 to 96 teeth, and 5 pinions of 6, 8, 10, 12 and 16 leaves, 4 wheels and 4 pinions in the striking part, and 2 wheels and 1 pinion in the time part. The whole is driven and kept in motion by one winding for 376 days, by a spring of a strength when wound up equal to only 13 pounds weight.

The improvement in the striking part consists principally in the application of a rotary hammer: is very simple, and requires 52 times less maintaining power than other clocks. The time part is driven by the striking part by means of a small spring, which forms a complete retaining power while winding, and like the striking part requires 52 times less maintaining power.

The great improvement in the time part consists principally in the regulating motion, and may be called a rotary or torsion pendulum: the ball is of a globular form and hollow, and suspended by a small spring: near the upper end of this spring is fastened an arm in the form of a crank. The ball being turned, twists the spring and causes the arm to perform an arch, acting upon and receiving the impulse from the swing wheel, by means of a lever connected with the arm; which impulse is carried through the spring to the ball and keeps it in motion. The spring in a quiescent state is longest: by its being twisted either way from that state is shortened, and the ball made to rise—returning by the reaction of the spring and the force of gravity—receiving the impulse from the maintaining power at each return. There is an irregularity existing in the common pendulum, by a loss of power arising from an

increase of friction, thereby lessening the impulse given to it and shortening the arc of its vibrations. If it measure true time in an arc of 4 degrees, it will gain 10 seconds a day by vibrating in an arc of 3 degrees, so that by an increase of friction and loss of power which is always the case, it will gain time.

Any difference of friction or maintaing power in this clock will not affect the time given by this pendulum: its revolutions or vibrations are rendered perfectly isochronal by the influence that the torsion of the spring has (when made of a certain width to its thickness) in its reaction, upon the force of gravity of the ball.

The different degrees of temperature do not effect the time given by this pendulum: the time it would lose by the expansion of the spring in length, is accurately counteracted by the time it gains by its expansion in width and thickness. Let the expansibility of the metal of which the ball is made be what it may, the time it would lose by its expansion outward from its axis of motion, is compensated for at the same time, by the time it gains, by the regulator rising on the spring and shortening the active part of it, by the expansion of the ball upwards from the nut on which it rests.

After this brief sketch of this remarkable invention, let us attend to some of its leading advantages:

1st. Very little care is required in setting up the clock, in consequence of its not being liable to be put out of beat.

2d. It requires lessw heel work, about 50 times less maintaining power, and the number of the revolutions are at least 50 times less; consequently there is much less friction, and the motion is much more regular.

3rd. Clocks can now be made at no greater expense, occupying no more space, requiring no more weight or strength of spring, than is now generally required in eight day clocks that will run one year, both striking and time part, with once winding up, and are perfectly silent, other than striking the hour, as there is no clicking: the whole is simple, easily adjusted and regulated, and when so, the time will not be altered, as in other clocks, by winding, by the difference of temperature, or by an increase of friction or weight, as the machine performs its movements always in the same or equal time—a desideratum in time-keeping which has long been sought, and next in importance to the first discovery of the pendulum. Newark Daily Advertiser.

Antiquities of Central America.—We listened last evening with interest and pleasure to the introductory lecture of Mr. Stephens, on the antiquities of Central America, delivered at the Stuyvesant Institute, before a numerous and respectable audience. We have read in detached parts the report of Captain del Rio, made by order of Charles the Fourth of Spain, in 1783; the more recent work of Lord Kingsborough, on Mexican and Tultucan antiquities; a work published a few years ago in Paris, and various correspondence from Tobasco, principally addressed to the late Dr. Mitchill, and have always felt the deepest interest in the subject; but here we had before us two living witnesses of the mighty ruins of an unknown people, on our own continent—Messrs. Stephens and Catherwood, both distinguished travellers,

who had in their time visited Thebes and Memphis, the Pyramids and all the wonders of Egypt, and consequently were in every respect well qualified not only to explore, but by comparison to throw great light on the architecture and character of those mighty ruins by which they were surrounded. These enterprising travelers encountered the greatest difficulties in penetrating what may be deemed a vast wilderness of forests, having ignorant Indians as guides, and no means of clearing the ruins of the immense trees and thick underwood, which almost obscured them from the sight within a distance of a few hundred yards. The first ruins visited were those of Copan, then Palenque and finally Uxmal, a great city on a vast plain, on the plantation of some gentlemen, who seemed to know nothing of its existence, and could give no account of it. A city of palaces, of vast masses of stone displaying great architectural beauty—terrace on terrace, hundreds of feet in length, in admirable preservation. Pyramids, colossal figures, hieroglyphics, courts, temples, altars, &c. which place the splendor of Nineveh and Babylon, of Balbec, Palmyra, Thebes, and Memphis, and of all the mighty wonders of the east, the history of which we have, far in the back ground. Who built—who inhabited these cities? How many thousand years have passed since their inhabitants have been gathered to their fathers? Where did they arise from originally? We agree with Mr. Stephens, who offers no speculation on the subject, that the history of the world is yet to be written. What two solitary travelers, almost alone in these vast ruins, could effect, has been done by Messrs. Stephens and Catherwood; but to lay bare these antiquities, some government, having the means and the enterprise, must send out a commission and an exploring party on a vast scale; whole forests must be cut down, roads must be made, the most learned antiquarians must be employed on the mission, and the results will astonish and amaze the civilized world. What government is to undertake this? France only, under the direction of the Institute, possesses the means, the learning, and the enterprise, to make the discovery, and we hope it will forthwith occupy public attention, for we are persuaded that hereafter the ruins of Central America, Peru, and Mexico, and not Egypt, will be the attraction to travelers. To-morrow evening Mr. Catherwood will lecture and exhibit his drawings of the ruins, taken on the spot. We shall then see the illustrations, and know more of the subject. Evening Star.

Sub-Marine Experiments.—Captain J. W. Taylor, of Boston, made some experiments at the Washington Navy Yard last week with his sub-marine exploring apparatus, in the presence of the Board of Navy Commissioners, and a large number of spectators. The correspondent of the Baltimore Sun notices the apparatus and experiments in the following manner:

The apparatus is composed of copper and India rubber, with a glass in front; and so constructed as to protect the operator from the pressure. He is supplied with air by a small flexible hose or tube connected with the air-pump, which is put in a boat and follows him as he progresses on the bottom. The diver carries with him a sub-marine lantern, attached to his dresss by means of a small flexible tube, which carries off the air which he has respired; there still being sufficient oxygen retained

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to support combustion, after which it passes through the valve without admitting the water. This enables him to see how to perform his operations in muddy as well as in clear water. He also carries a match which burns regularly. Thus equipped, Captain Taylor descended the eastern branch, and deliberately crossed over to the opposite side; a scow having been placed in the stream, with combustibles fixed in the bottom, the captain applied the match and blew her from thirty to fifty feet out of water. The experiment was highly satisfactory, and I understand it is contemplated to repeat it in a few days, in the presence of the President and Ministry.

Trees.—There are fifty-six species of trees in the United States, large enough for timber—among them, ten species of the oak.

FOREIGN.

Improvement in Lithography.—By this improvement a new effect of light and shadow imitating a brush or stump drawing is produced. To effect this the plate or stone is first grained as for a chalk drawing; a polished plate or stone may be used if preferred, but a grained stone is recommended as being much more pleasant to work on. The drawing being completed on the plate or stone with ordinary lithographic ink dissolved in water, and with the use of a brush, or hair-pencil, or with a stump, it is prepared with an acid as is usually done with chalk drawings. After it is thus prepared and well dried, the plate or stone is placed in an inclined position and a solution of resin in a volatile solvent, such as is generally used in aquatinting, is poured all over the drawing. As the solvent evaporates, the resin cracks or retracts in the usual way just as is the case in laying a ground upon a polished copper or steel plate previous to engraving in aquatint.

By this means the drawing becomes protected wherever it is covered by the resin, while all the numerous and minute interstices between the particles of resin are unprotected and exposed. The plate having been carefully warmed to set the resin firmly upon it, is to be exposed to the action of nitric, muriatic, or other acid capable of acting upon the stone, combined with gum water, in the proportions of one part of acid to six of gum water. The etching action of this acid on the exposed surfaces of the stone produces the "new effect of light and shadow," sought to be obtained by this process.

The following ground is recommended, having been used with much success by the patentee:—four ounces and a half of resin, and a quarter of an ounce of common pitch are to be dissolved in a quart of spirits of wine; after being well mixed, the mixture is to stand for three days, being strained, it is then fit for use. Mech. Mag.

Liberality of France to Artists.—The French have long possessed an establishment under the immediate patronage of government for procuring moulds from interesting monuments of art and diffusing casts from these at the cheapest possible rate. Moulders are constantly employed in foreign countries, as well as in different parts of France, in

making moulds from the choicest works in sculpture and architecture of every age, from the earliest times down to a late period. French moulders are to be found not only in the capital cities of Italy, but also in the ancient towns which offer so many interesting specimens of the arts of the middle ages. A few years ago, as I have already stated in a former paper, elsewhere, 14,000 dollars were spent in Florence alone, in making moulds which were afterwards conveyed to Paris. How advantageous the results of such a system! In Paris artists of every description may find specimens of sculpture from every statue and building with which they are acquainted. Architects may at a very small cost, in addition to their libraries, form museums, containing casts from portions of the buildings, the plans and elevations of which their books contain. Engravings however perfect, can convey but a faint idea of the graces of execution in architectural sculpture, and I think that the consequences of designing from these alone are sufficiently illustrated, in our cold, spiritless, and precise ornamental details.

Cor. of Civ. Eng. and Arch. Jour.

Force of Gunpowder.—The projectile force of gunpowder depends on the instantaneous converson of the solid materials into a permanently elastic fluid, which is at the same time greatly increased in volume by the intensity of heat (which I have experimentally found, even on a very small scale, sufficient to melt copper instantly.) Now it has been ascertained that one cubic inch of gunpowder is converted into 256 cubic inches of permanent gases when cooled down to the temperature of the atmosphere; and Dr. Hutton has calculated that the increase of volume at the moment of ignition cannot be less than eight times; therefore, a cubic inch of gunpowder at the time of explosion, if confined exerts a pressure of at least 2,000 pounds on the square inch in every direction, which may at once account for its extraordinary power.

Engines of War, by Wilkinson.

Horticultural Society.—A communication was read from Dr. Horn, on a simple mode of destroying slugs by galvanic action, consisting merely of a plate of copper and zinc in contact, and which was found very destructive to them when they touched either. The show of flowers was very good, amongst the most prominent being a collection of hyacinths in pots, planted in charcoal and sand, which had been watered by solutions of different salts of ammonia and other salts. Those bulbs which have been supplied with distilled water flourished well, whilst all the others were stinted in the growth of their flowers or leaves, showing that this bulb does not improve under artificial treatment.

Apparatus for Preventing Shipwreck.—A few months since we gave an account of an interesting attempt made by Mr. Page, the superintendent of our Harbor Works, for simplifying Captain Manby's plan for relieving vessels in danger of shipwreck. It is with the greatest pleasure that we have to state that Mr. Page has *tested* the value of his efforts by saving a vessel, to all appearance, destined to inevitable destruction. About one o'clock P. M., of the 13th of February, the schooner *Leighton*, Jones, master, was seen making for this port, and driving with a heavy sea right for the north side of the harbor, where we have witnessed

many a wreck with loss of life and property. The sea being at this so heavy, and the boat, with the pier rope, being unable to get through, in consequence of the surf, the vessel struck on the North Bank. The situation of the vessel was now so critical, and the breakers surrounding so violent, that no boat attempting to relieve her could live. Under these circumstances, Mr. Page brought the twelve pounder belonging to the Harbor Works to bear upon her, and at the first discharge, succeeded in conveying a rope across the breakers, which passed fairly over her rigging. To this rope, a hawser was fastened by those on the pier, which, being hauled by the crew on board, sufficiently steadied her, and the result was the vessel was saved. We feel it our duty to give publicity to this circumstance, feeling perfectly confident that were it not for the rope conveyed by the carronade, she would either have been a wreck, or have received considerable damage. James Davies, Esq. the owner was present, and seemed not a little pleased at the result of the first trial of Mr. Page's experiment.

Since the appearance of the above paragraph, the above plan has been again adopted with complete success, but with such variation, as to give it additional value, by showing the versatility of its application. On the 23rd ult., the schooner *Nanteos*, Griffiths, from London, appeared before this port, but the breakers were so high, that it was impossible for any boat to go out to assist her in. On this occasion the *carronade* was fired from off the pier, which carried the *plug* beyond the breakers,—this was picked up by the boat from the Nanteos, and a communication was immediately made with the shore, and the vessel came in without any difficulty.

The advantage of the *plug* over a *shot*, may be seen on occasions like the present,—had this been a *shot* connected with the line, it would have sunk, but the *plug* floated, and was easily picked up by the boat from the Nanteos. Carmarthen Journal.

London Mechanics' Institution.—On Thursday a meeting of the proprietors and members was held in the Theatre of the London Mechanics' Institution, Southampton-buildings, Chancery-lane. The theatre was unusually crowded, as it was expected that six students, who had been expelled for insubordination, would appeal against the decision. Mr. Reader, the secretary, read the sixty-ninth quarterly report of the committee. It appeared that the receipts amounted to £433 11s. The actual expenditure was £243; which, together with the debt from the previous quarter, amounted to £405 12s. The total liabilities (including the building debt of £2,350,) were £2,636 5s. The number of members last quarter was 1,019, since then 204 were admitted, and 223 had discontinued; nine sons of members, and eighteen ladies, were admitted; there were then 1,047 members and subscribers, and 187 students; 6 vols. and 10 pamphlets had been presented to the library, and 91 vols. were also presented, having been purchased by the proceeds of a concert given by the members of the institution. The report being adopted, Dr. Birkbeck was re-elected president, and Messrs. Grote, M. P., Ewart, M. P., Clutterbuck, and Sir W. Horton were elected vice-presidents, and Mr. R. Taylor, treasurer. A letter was then read from one of the students expelled, apologizing for his miscon-

duct, and praying his name might be restored to the books. On the motion that the decision against the student be reversed, a discussion ensued, when the sentence of expulsion was confirmed by a large majority. Appeals were then lodged by the remaining five students expelled. The students expelled were under eighteen years of age.

Pressure of the Sea.—If a piece of wood, which floats on the water, be forced down to a great depth in the sea, the pressure of the surrounding liquid will be so severe that a quantity of water will be forced into the pores of the wood, and so increase its weight that it will be no longer capable of floating or rising on the surface. Hence the timbers of ships which have foundered in a deep part of the ocean, never rise again to the surface like those which are sunk near the shore. A diver may, with impunity, plunge to a certain depth in the sea; but there is a limit beyond which he could not live under the pressure to which he is subject. For the same reason, it is probable that there is a depth below which fishes cannot live. They have, according to Joselin, been caught in a depth at which they must have sustained a pressure of 80 tons to each square foot of the surface of their bodies.

Gum Paste.—In the course of some experiments which we made about twelve months ago with different kinds of gum, for stamped labels for letter stamps, we found that gum tragacanth, a fine Persian gum, was by far the most efficacious. By simply mixing it with water, it forms a beautiful gelatinous paste, which is easily spread, and is particularly tenacious. Wishing to keep a small supply of this kind of cement always by us, and aware that if mixed with water it would be apt to become offensive, we substituted vinegar for water, and prepared a bottle of the mixture for occasional use. It is now as effective and as free from offensive odor as it was the day when it was first mixed. This sort of preparation is particularly useful for another purpose than as a paste for paper, as when applied as a cement to reünite a limb which had been broken from a plaster image, it was found to answer the purpose remarkably well. Liverpool Mercury.

Dye from Aloes, Aloëtic Acid.—This substance, obtained by the action of nitric acid upon the resin of aloes, is a powder of a deep brown-red color, very bitter and astringent; it requires 900 times its weight of water to dissolve it, and only from 70 to 80 parts of alcohol. It consists of carbon 40, hydrogen 1.1, azote 12.2, oxygen, 46.7 M. Boutin has ascertained that this substance is capable of communicating a great variety of shades of color to wool, but especially to silk. In mordanting silk in a solution of acetate of copper at a temperature between 158 and 176°, washing it then in an ammoniacal fluid, passing it through a bath of *aloëtic acid* at the same temperature as the mordant, and finishing it by exposing it to weak vinegar, *wood* shades *(les nuances bois)* are obtained. The *Corinthian (nuances Corinthe)* shades are procured by plunging the silk into a dilute solution of tartaric or citric acid at the temperature of 104°, and passing it through an aloëtic acid bath at a heat of 122 to 140°. The *rose* tint is obtained in a similar way; the bath being very slightly changed, and containing a small portion of alum.

Violet shades are obtained by adding to the *aloëtic* acid bath liquid ammonia and acetic acid. For silk, the bath ought to contain an excess of acid; for wool, the ammonia should predominate. *Blue* colors are formed by adding to the aloëtic bath a double salt, prepared with protochloride of tin and cream of tartar. The bath becomes first violet; a solution of chloride of tin and tartaric acid is then added; a small quantity of ammonia then suffices to convert it to a blue, into which the silk is to be plunged. *Green* is produced by passing the silk, dyed yellow by carbazotic acid, into the bath, which has become blue by the preceding process.

Evaporating power of Coal.—At a recent meeting of the Society of Arts for Scotland, the president, Dr. Fyfe, read an interesting account of a series of experiments "on the evaporating power of various kinds of coal," (including anthracite) as obtained by combustion in furnaces. The general result of these experiments seemed to be that the practical heating power of all coals is almost exactly in proportion to the quantity of fixed carbon; there appearing to be no additional heat whatever procured from the volatile matter of the coal. This circumstance Dr. Fyfe accounted for by supposing that the hydrogen and volatilized carbon, abstract, in passing to the gaseous state, as much heat as they develop during combustion. The constituents of the several kinds of coal used were ascertained by analysis to be as follows:

	Scotch.	English.	Anthracite from Wales.*
Moisture, - - - - - -	7.5	1.5	4.5
Volatile matter, - - -	34.5	29.5	13.3
Fixed carbon, - - -	50.5	67.0	71.4
Ashes, - - - - - - -	7.5	2.0	10.8

If it shall be found that the practical evaporative power of fuels in their native state is according to the per centage of fixed carbon they contain, an easy method is afforded of determining the value of any fuel for generating steam and similar uses, which is to ascertain what proportion of it is fixed carbon. This may be done by exposing a certain weight, say 100 grs. of it, in a covered crucible for some time to a red heat, to drive off the volatile matters; when cold, to weigh the residue, and afterwards expose it to a red heat in an open crucible or on a platinum foil, till it ceases to contain any admixture of carbon, which is easily known by the appearance of the residue: the loss of weight thus sustained, deducted from what was left by exposure to heat excluded from air, will give the weight of fixed carbon. Abridged from Jameson's Jour.

Tractive power of the Horse.—Mr. E. Morris has communicated to the Franklin Journal some important experiments on this question; whence he takes the mean day's work of horses fully loaded to be as follows:—Of *picked* horses at 16,500,000 lbs. lifted one foot high per day. Of *common* horses at 12,900,000 lbs. lifted one foot high per day. This average result for *common* horses is equal to a continued pull of

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* A mean of several analyses, by Prof. Johnson, of anthracite from the coal-fields at the head waters of Beaver Creek, in Pennsylvania, gives the proportion of fixed carbon as 89.56. [See Jour. Franklin Inst. for Nov. 1839.]

nearly 135¾ lbs. at the rate of 2¼ miles per hour for 8 hours out of the 24. The pace of 2¼ miles per hour, or more accurately 200 feet per minute, has been ascertained by the writer from numerous experiments upon horses hauling earth for embankments in single carts, as well as from some trials with teams of four, to be that at which horses in common use on public works generally proceed when working with full effect. The horses employed upon public works, averaging the working time of the whole year, are worked nearly 10 hours out of 24 hours; for which time however they would only be able to exert a mean force equal to a steady pull of about 108½ lbs., and the pace and the dynamical results would both be found to remain nearly as above.

Butterflies.—At a late meeting of the Entomological Society, a paper was read by R. H. Schomburgh on the migration of butterflies *(papilio)* in British Guiana. Mr. S. detailed some curious facts relative to the great number of butterflies (of which he could distinguish three kinds) he had observed during his travels in British Guiana, at certain seasons. On one occasion when ascending the river Berbice, a flight of butterflies crossed the river from the plains, and all taking one course, viz. from the south-west to the north-east. From computations he then made, he is convinced that in 9½ hours no less than 17,100 butterflies must have passed over a single spot, and that at least 5,300,000,000 must have passed over him during his day's journey. The caterpillars of these insects likewise abound in the proper season, and create great devastation to the herbage on which they feed. The tawny natives mix the caterpillars with flour, and make an excellent bread, some of which Mr. S. has eaten; they likewise eat them mixed with the eggs of the turtle.

The president, Rev. Mr. Hope, then made some observations on the subject, and stated that migrations of a similar character had been noticed by Sir R. K. Porter in South America, and Dr. Horsfield in India. They have also been observed in Switzerland, and Mr. Westwood has witnessed a similar fact in England after damp rainy weather. Mr. Gould, who has recently returned from Australia, stated that he had seen a small caterpillar in that country in great numbers, covering a space of a mile and a half in extent: they always follow a fertile season, and especially after rain, when they devour every herb within their reach, such as tobacco, and even the vineyards are sometimes damaged by them. They are preyed upon by hawks, Mr. Gould having seen 500 on a plain at one time feeding off them. He has eaten those obtained from the gum trees when roasted, and states them to be good eating: they are partaken of by the natives.

[It is a curious fact that on those parts of the coast of America which are particularly liable to the yellow fever, the approach of the disease is frequently announced by immense flights of moths or butterflies. A gentleman who was at Jamaica a few days before the time when the yellow fever usually showed itself, stated to us that the whole air seemed thronged and actually darkened by these moths. He described the appearance of the atmosphere when looking upwards, to resemble that produced by a heavy fall of snow. In three days afterwards the yellow fever was ravaging the place.—*Ed. Inv. Ad.*]

Ophinine Process of Printing.—This is the name given by Mr. Morison to a peculiar method of printing by means of cylinders, of which that gentleman is the inventor and patentee. The principle which forms the basis of the process is, that if two cylinders be made to communicate motion one to the other, by means independent of the contact of their surfaces, they will give off on each other, or on any intervening surface, exactly the same quantity of ink as may have been received, by one or more of them, from another cylinder moved by the same influence as the first. By the application of this principle, Mr. Morison is enabled to supply a surface of types with a constant and equal coating of ink; and whether the types, or other surface to be printed from, be placed on a cylinder and moved circularly, or a vibratory movement, backwards and forwards, be imparted to a plane surface, as the supply of ink keeps pace with the movement of the surface, impressions may be taken as rapidly as two men can supply and take out the paper. The inventor has further applied this principle to cylinder printing in colors, which is effected by fixing round a drum a number of cylinders, each supplied with coloring matter from a separate inking apparatus, and so arranged that their several impressions upon the paper supplied by the drum combine and form an entire figure. The motion of the whole apparatus proceeds from that of the drum, from which all the cylinders receive movement by means of cogs. A little literary production, called the *Page of Knowledge*, ornamented with colored designs, has been produced by Mr. Morison, from a rough working model, and consequently under great disadvantages; notwithstanding which, it is evident that the principle is true, and that all the defects are owing to departures from it, which the restricted means of Mr. Morison were unable to avoid. One of the most valuable results of the process thus briefly described is, that, as the degree of pressure exercised by the rollers, one on the other, is completely under command, it becomes possible to take impressions from the slightest conceivable elevations, or from the most flexible substances, without wearing or depressing them. The designs in the above mentioned pamphlet are printed partly from cork, partly from leather and soft wood, and others from relief drawings, executed by scratching on the reverse side of a thin plate of metal—a method which admits of producing designs with the greatest rapidity. Inv. Adv.

To Produce Light by Friction.—This may be done by rubbing two pieces of fine loaf sugar together in the dark—but in a much greater degree by two pieces of silex or quartz. By this means one may distinguish the time of night by a watch—but what is more surprising, the effect is produced equally strong by rubbing the pieces of quartz together under water.

Nutmeg is the fruit of the *Myristica Moschata*. The tree is a native of the Molucca Islands; but has been nearly extirpated by the Dutch, except in Sumatra and Banda, where enough is raised to supply Europe. The covering of the nut is known by the name of *mace*. The nutmeg varies in size and figure. It is furrowed on the outside and greyish brown internally. Those that want white streaks are the best. From the experiments of Neumann we learn that the substance contains two species of oil: a volatile oil to which it owes its peculiar

smell and taste, and which in his trials amounted to about 1-32d part of the nut; and a solid fixed oil resembling wax, and amounting to about $\frac{1}{3}$ of the nutmeg. He detected also a quantity of gum, and it is probable from the appearance of the kernel, that it contains likewise starch. By expression the solid oil is separated, and mixed with the volatile oil. In that state it is sold under the name of *oil of mace*.

Thompson's Vegetable Chemistry.

Lit. and Phil. Soc. of St. Andrew.—At a recent meeting of this society Sir D. Brewster communicated a brief abstract of his observations on the polarizing structure of the atmosphere. In 1812 he discovered the general fact of the polarization of the light of the blue sky, of clouds, and of the rainbow, and published an account of his observations in his treatise on new philosophical instruments. Since that time M. Arago discovered that there was a neutral point in the sky about 30 deg. above the point opposite the sun, where the light was not polarised; and M. Babinet has more recently (in 1840) discovered that there is another neutral point about 25° or 30° above the sun itself. Sir David Brewster, however, has found that there are four neutral points in the atmosphere—a third being as far below the sun as M. Babinet's point is above it—and the fourth being as far below the point opposite to the sun as M. Arago's point is above it. He was led to these results in consequence of observing the remarkable fact, that the light on one side of each neutral point was polarized in a plane opposite to that of the light on the other side, and that all the phenomena arose from the existence of two opposite causes, one of which polarized the sun's light by reflection, and the other by refraction—these causes compensating or neutralizing each other by equal and opposite actions at the four neutral points which are movable within certain limits. The predominating influence is, in a serene sky, that which polarizes by reflection; but Sir David has found that in other states of the atmosphere, this influence is sometimes exactly counteracted by the opposite influence, and sometimes more than counteracted, so that the polarization, even in the zone of 90 deg. from the sun, is opposite to what it is in a serene sky.

Sir David read a letter from W. J. Broderip, Esq., vice-president of the Zoological Society, mentioning a very remarkable property possessed by certain land shells, viz., the Helix pulcherrima (Young,) the Helico-bulinus (Broderip,) the Bulinus fulgetarum. Upon immersing the shells in water, the white parts of the pattern almost entirely vanish; and when the shells, after having been well saturated, are withdrawn from the water, the pattern gradually re-appears as the shell dries, till it is as perfect as it was before immersion. Mr. Broderip sent several specimens of those interesting shells, for optical examination, to Sir David Brewster, who found that the pattern existed only in the epidermis, the white parts of which absorbed water and oils, like tabasheer and certain other siliceous bodies; and again discharged the water from its pores when it became dry. The epidermis, when saturated with water, became transparent; and as the coloring matter of the shell was seen through it in this state the white pattern almost wholly disappeared. When the pattern becomes dry the light incident upon it was reflected at the surface of its pores and it again became white, the pattern always appearing dark when it was seen by transmitted light—when the pores are made to absorb oils or thin

varnishes, which do not evaporate, they may be permanently obliterated. The species possessing this curious property all lie in deep forests, and were taken on the leaves of trees. They form part of a large collection formed by Mr. Hugh Cumming, in the Philippine Islands, and containing upwards of two thousand new species and varieties.

Everlasting Fires.—A paper was lately read at the Royal Irish Academy, by Mr. G. J. Knox, "On a Principle for producing an Ever-burning Flame."—"A belief," he observed, "in the discovery of an ever-burning lamp, appears to have been prevalent in all ages; and tradition informs us that lamps have been found in tombs, where they have continued burning for upwards of 1,000 years, of which mention has been made in the works of St. Austin, Plutarch, Pliny, Ludovicus Vives, Baptista Porta, and Licetus. The Rosicrucians, who laid claim to the knowledge of every thing mysterious, pretended to have re-discovered the secret of their construction, which was supposed to have been buried in the tomb of their founder. Dr. Plott, in a treatise which he has written upon this subject, alludes to a lamp, mentioned by St. Austin in his book de Civitate Dei, which was hung up in the temple of Venus; and to another found in the tomb of Pallas the Arcadian, who was slain by Turnus in the Trojan war, which continued to burn after its removal from the tomb and exposure to the air; proving that these lamps were not supplied from any bituminous source, or volcanic fire. He considers the requisites for an ever-burning lamp to be,—a perpetual wick, which might be made of gold wire, or asbestus; and a perpetual supply of fuel, which he imagines the bituminous springs of Pitchford, in Shropshire, or the inflammable gases issuing from fissures in coal mines, would afford. That such could supply fuel for a flame so long as the bituminous spring existed, or the gas continued to exhale from the mines, is evident; but it no more deserves the appellation of an ever-burning lamp than does a fire arising from any volcanic source. The desideratum for such a lamp is, that it should contain, within itself, a renovating principle, such as, probably, does the luminous atmosphere encompassing the the body of the sun, supposed by Sir William Herschel to be electrical. That electricity is the principle upon which such a lamp could be constructed having occurred to me some years ago, I reflected upon the different means by which a constant light could be produced from this source, and concluded that, if by an arrangement of metals a thermo-electric current could be produced of sufficient intensity to decompose water, the heat produced by the burning of the two gases arising from the decomposition would be sufficient, when applied to the alternate metallic junctions, to continue the electrical current of the thermo-electric pile; while the gases, which in burning become aqueous vapor, might be condensed by passing through a long tube, through which, being conveyed to the closed vessel in which the water had been originally placed, they would again undergo decomposition, recombination, and condensation. Such a thermo-electric arrangement has been discovered by Professor Botto, of Turin, who has obtained decomposition of water from a series composed of a great number of wires of platinum and iron. To prevent the apparatus from acquiring in time the same temperature, the alternate junctions of the

metals, to which the heat is not applied, might be connected with the pedestal upon which the lamp is placed; and the pedestal be either allowed to rest in a cold station, or else be connected by wires with some extensive cooling surface."

New Application of the Daguerreotype.—At the sitting of the French Academy on the 1st instant, a new and important improvement in the application of the Daguerreotype was announced to have been effected by M. Fiseau. He had previously greatly added to the practical effects of the instrument by contriving the means of fixing the image on the plate, so as to prevent its being easily rubbed off, and by adding to the depth of the shadows, by means of chloride of gold. His present improvement consists in applying M. Jacobi's electrotypic process to taking permanent impressions of the Daguerreotype on copper plates. By this means the particles of copper are deposited by a current of galvanism on the image, fixed by the chloride of gold, by which an engraved plate is made, which produces a beautiful effect. The original image is not only reproduced with all its minute and accurate details, but it may probably serve to take impressions on paper, or at least as a drawing of the greatest possible perfection for the engraver. The image when taken thus on copper has a most astonishing effect, and much merit is due to M. Fiseau for the discovery, which may have important results in the arts.

Improvement in the Steam-Engine.—A patent has lately been taken out by Mr. Thomas Stather, foreman to Messrs. Overton and Wilson, founders and steam-engine manufacturers, for an invention of his own, viz., the introduction of what he calls the steam-engine "controller." This new invention is for reversing the motion of the engine, and that instantly, by a most simple contrivance. The inventor states that his controller may be fixed in front of the helm, or a duplicate may be fixed on the paddle-box top, or centre of the platform (from paddle-box to paddle-box,) so that the man at the helm or the captain shall have full and perfect control of the engine. The working model which he exhibited at a lecture in the Mechanics' Institute, going at a rapid rate, obeyed, as soon as the words of command were spoken, viz., "slow," "backward," "quick," "forward," "stop," to the surprise of all present. The enthusiasm manifested at the wonderful control gained over so powerful an agent was such that it burst forth in loud and repeated applause for some time. By the present method the engine is stopped by removing the eccentric out of its gear, but by this discovery the eccentric remains undisturbed. In locomotive engines the extra eccentric rods will be dispensed with, only one being required, and thus saving from £200 to £300 in cost. Hull Advertiser.

M. Collas's mode of Copying Sculptures.—To construct an instrument which without the assistance of the artist or the workmen can produce with the most minute exactness any kind of sculpture, whether medal, bas-relief, or statue, and increasing or diminishing the proportions without altering the harmony of the whole; to produce a copy in wood, stone, ivory, or marble, with such great correctness that the original cannot be

distinguished from the copy; such is the difficulty that M. Achille Collas has overcome. Considered in a scientific point of view, the machine, invented by M. Collas, for the re-production of plastic monuments, is one of the finest conceptions ever known, and places the inventor in the first class of celebrated mechanics. Considered in its relation to the fine arts, the invention is to sculpture what printing is to written thoughts. A beautiful statue may, henceforth, in the same manner as a good book, be the means, without incurring any chance of change or loss, of transmitting the name of its author to distant generations. There will no longer be any distinction between the original and copy; each of the impressions will itself be the model containing the original and entire idea of the artist, and all this is effected by means of a simple machine! A child turns a wheel, a point touches delicately every part of the model with the most minute exactness, without leaving the least mark; the point acts on the chisel, the chisel cuts the marble and renders it in a state fit for operating on. By means of another process the figures of the copy are brought out, stop, or become more finished. As we have previously said, the machine of M. Callas can reduce, with the most accurate mathematical precision, and this to an almost infinite degree, the statues that are too large to be admitted into the studio of the artist or into the collection of the amateur. We have already expressed our admiration of the bas-reliefs of the Parthenon, the originals of which are in London; the Venus of Milo, still so admirably beautiful, notwithstanding its numerous mutilations, and many other valuable models, reduced in proportion of two fifths and a half, with an accuracy that is scarcely conceivable. To copy the most remarkable works dispersed in Italy, Germany, and England, to reduce them in regular proportions, to collect them in a vast universal museum, to afford the student without loss of time an opportunity of studying at home copies in every respect equal to the originals, such are the expectations that M. Collas, with the assistance of enlightened men, will be able to realize. Le Fanal.

The new Russian Musket.—A meeting of several military and scientific gentlemen took place recently at Chalk Farm, for the purpose of testing the comparative merits of the detonating musket, now about to be generally introduced into the British service, and that invented by the Baron Heurteloupe for the use of the Russian army. Though the day was wet and boisterous in the extreme, 160 rounds of ball cartridge were fired from the Baron's gun in an inconceivably short space of time, without a single failure or hang-fire; and, indeed, from the formation of the piece itself, which has the lock placed under the barrel immediately before the trigger, and which is further, by a most ingenious contrivance, completely secured from the action of the weather, the priming being contained in a continuous thin flat metal tube, impervious to moisture, and enclosed in the stock of the gun itself, rain or wet can have no effect on the action of a musket so constructed. It is, however, the composition contained in this tube, and the simple manner in which it is acted upon, that gives the invention its great superiority over all other fire-arms now in use. The tube in question, which is about eight inches long, and about $\frac{1}{8}$ of an inch wide, contains denotating powder, sufficient for 30 primings, and is in the first place inserted

in the body of the stock, under the barrel. A very simple mechanism causes the extremity of this tube to advance over a flat topped nipple, and the cock which strikes it is so constructed as to cut from the tube that portion which lies over the nipple, and the hammer acting upon it almost simultaneously produces the discharge. Leaving out of the question the chemical merits of a composition, which will admit of a part being cut off and exploded, without igniting the remainder of the contents of the tube, the mechanical merits of the gun as a military engine are extraordinary; it combines within itself all the *desiderata* of cheapness, strength, simplicity, certainty of fire in all weathers, and capacity for rapid execution, which are required in a soldier's weapon, and is as great an improvement over the common copper cap lock as that is over the old flint and steel principle. Many old officers have doubted the wisdom of adopting the copper cap for soldier's fire-arms, and there can be no doubt that in a military point of view it is subject to many grave objections on the score of inconvenience to the soldier using it in wet weather, or with cold hands, from its liability to fall off and split when exploded, to the injury of the man standing next, from its great insecurity from dampness, its chemical affinity for moisture, and its liability to be injured by hygrometric changes, not to mention its difficulty of management in the clumsy and awkward hands of a soldier, acting in haste, under the excitement of fire. The whole of these drawbacks are said to be avoided in the Baron's invention, which, in the opinion of the military men present at the experiment, was by far the best adaptation of the detonating principle to the common musket that has yet been seen. We are informed that the gun in question has lately been submitted to the inspection of the Master-General of the Ordnance, with a view to its adoption in the British army. The recent experiments convince us that the Baron's invention can be applied to all fire-arms, and it is without exception, the greatest improvement yet accomplished. Times.

Purification of Sea Water.—The *Moniteur Industriel* gives the following account of the trial of an apparatus for obtaining fresh water from the sea:—"On Wednesday a number of merchants and naval men, among whom we remarked Admiral Baudin, were present at No. 6, Rue de Buffaut, to witness the trial of a new and very simple process, employed M. Frederic Sallier, to obtain fresh and drinkable water, by purifying the water of the sea. The apparatus used for this experiment is intended for a vessel of 500 tons. It is a kitchen in which a still is placed, whence the distilled water runs into a filter, which purifies it, and renders it drinkable by its absorption of atmospheric air. This apparatus does not occupy more room than the usual size of a kitchen on board of ship. The same fire used for distilling the water serves for cooking. The mechanism is very simple, and the cook can superintend the distillation, which may be thus said to be done without trouble, by means of a pump which fills the boiler when he requires it. The last experiment, which lasted eight hours, produced 122 litres of pure water, with 30 kilogrammes of coal, and during these eight hours the pans used for culinary purposes were constantly boiling. Sea-water, purified by means of this process, possesses all the qualities of

the best spring water; it has been used for dressing vegetables, and no difference was perceived between it and the water of the Seine.

A Trip to the North Pole.—The *Gazette du Midi* gives the following extraordinary account of an alleged visit to the North Pole, by some Russian scientific explorers. The account is taken from a St. Petersburgh periodical, *Le Journal Scientifique et Litteraire*, and the *Gazette* appears to credit the statements. The notion of a *frozen flame* seems to surpass Baron Munchausen's veracious statement as to frozen sound; but as the account appears in a publication professedly devoted to science, and as the people of St. Petersburgh may be supposed to know more about the effects of cold than we can in this warmer climate, we give the narrative as it appears in the *Gazette du Midi*. Our readers may believe as much of it as they please; we confess we want faith.

A St. Petersburgh periodical, *Le Journal Scientifique et Litteraire*, publishes a very extraordinary narrative of an expedition to the Arctic regions, under the command of M. Nidjnei Nitigoïwosnesenk. If the narrative be not exaggerated, that traveller would appear to have reached within a few wersts of the pole.

The occurrences he reports are of so marvellous a nature that we certainly cannot vouch for their veracity; but they are too curious not to be laid before our readers, and we shall add that M. Nidjnei Nitigoïwosnesenk's *memoire* has been submitted by that traveller to the academies of Moscow and St. Petersburgh. It is difficult to believe that any body would have ventured to call the attention of two such respectable bodies to facts not offering every guarantee of truth; and an additional proof that fiction has nothing to do with this wonderful narrative is, that M. Nidjnei and his companions, having arrived at St. Petersburgh on the 15th of December, a deputation from the Academy went out to receive them, and the Emperor was pleased to confer the Order of St. Wladimir, of the 2d class, on the head of the expedition.

"Embarked in the Catherine II. frigate, we arrived on the 5th September at the northernmost point of the Samoides' land. We were obliged to give up passing any further owing to the enormous icebergs which began to obstruct our course. The frigate was moored in a sort of creek, which we had the good fortune to discover as we followed the coast, and we immediately betook ourselves to preparations for continuing our exploration by other means. The sledge we had got built with that view at St. Petersburgh was put together on deck, and filled with provisions and instruments indispensable for the hazardous enterprise we were about to venture upon.

"At about the eighty-eighth degree of latitude, all the dogs that had hitherto dragged our equipage were frozen, so that in order to advance we were compelled to use our long iron hooks, which was a dreadfully fatiguing task. The cold made us suffer horribly, despite of the seventeen bear skins with which we had each of us taken the precaution to cover ourselves. It was also in the same latitude, or thereabouts, that chance yielded us one of the most curious discoveries that have enriched the physical sciences in latter times. It occurred thus: for some days we had made no fire for want of wood, when in searching our box of provisions I found some Lyons chesnuts which M. Arago had

sent me as a *souvenir*. I took it into my head to roast them. We put together some shavings which we still had, and kindled them. A bright flame forthwith arose, and we were anticipating the sweet sensations it was about to yield us, when suddenly an incomprehensible phenomenon manifested itself. The flame at first so bright and crackling, seemed struck with immobility, and was gradually covered with a solid crust . . . . it was congealed!

"Our astonishment baffles description. (A scientific description of the ice thus produced then follows.) I broke a bit of it and put it into my mouth. Contrary to my expectation, the sensation which resulted was most agreeable; just fancy a little taste of barley-sugar extremely refreshing, though accompanied by a light burnt smell. I am persuaded that when such ice shall be produced by artificial means, confectioners will turn it to great account.

"A little further on another phenomenon, not less remarkable, awaited us. We had for some time perceived an increased rapidity in the progress of our sledge, though we used our iron hooks but little. The phenomenon was soon explained: one of us having dropped his hook the moment he attempted to pick it up we saw it gradually remove from us, flee before us, and ultimately whiz as it split the dense atmosphere around us. Though already accustomed to the wonders which those mysterious regions had presented to us, as it were, at every step, we stood mute with astonishment, but were soon roused from our amazement: our sledge, which was almost wholly made of iron, seemed pushed on by a fatal, irresistible, and invincible power, such as that which draws a light boat towards a cataract; we tried to stop it, but could not succeed, and were compelled to leave it to the mercy of heaven.

"The magnetic power of the pole produced its effect, and, after a few hours of that fantastic progress, we were enabled to perceive by the light of an aurora borealis the sombre and mysterious extremity of our globe. It consisted of enormous mountains, probably of pure loadstone, divided into huge strata, of various colors, green or blue. One would have fancied the back of a gigantic zebra was rising before us. Alas! unless Providence vouchsafed us unhoped-for assistance, we must soon be dashed to pieces against it. Impelled by the proud demon of science we had tempted Heaven, and already did we feel its hand suspended over our heads ready to crush us.

"Nevertheless, thus isolated in that vast frozen solitude, and fatally dragged to destruction, we were calm and resigned, so great is the power of the grand mysteries of nature over man! Some tears, only, flowed in silence, and I heard beloved names uttered, when, suddenly, a sort of barrier of icebergs, heaped over one another, made us deviate from our course, and at the same moment, and in a few seconds, a force as powerful as that which had made us before devour space in front of us, made us roughly recede . . . . We had just fallen into a negative magnetic current. . . . . We were saved, and saved carrying away with us the most awful secrets of nature. It was enough to run mad with joy. We raised our hands to Heaven."

The *Journal Scientifique et Litteraire* announces that the whole *memoire* of this marvellous expedition is to be shortly published.

DESCRIPTION OF AMERICAN PATENTS

Granted from Feb. 3d to March 3d, 1841.

Machine for manufacturing Cannon Balls and other kinds of Shot, from Malleable Iron, Lead, &c. By LEWIS GRANDY and THOMAS OSGOOD, Troy, N. Y. Feb. 3d.

CLAIM.—But what we do claim as constituting our invention, is the manner in which we have combined the cutting apparatus for separating the pieces of metal from the bars, with the reciprocating straight swages, or with revolving swages, or with straight and revolving swages combined, in such manner as that the pieces of metal cut off and to be rolled into balls shall pass successively between two or more pair of swages, in a machine constructed and operating substantially in the manner of that herein described and represented.

Improvement in the manner of forming Blocks of Wood for Paving Streets, Roads, &c. By STEPHEN CAREY, New Orleans. Feb. 3d. [Antedated Jan. 29, 1839.]

CLAIM.—What I claim as constituting my invention, and desire to secure by letters patent, is the giving to their sides, where they come into contact with each other, concave and convex faces, alternately, in the manner herein fully set forth, by which mode of forming and combining them they are each supported by, and aid in supporting, the surrounding blocks, as described. It being distinctly understood that when one side of a block is convex, its opposite side is so likewise, and *vice versa*.

Improvement in the method of constructing the machine used for Splitting Leather. By ALPHA RICHARDSON, Boston, Mass. Feb. 9th.

CLAIM.—I do not claim to have invented anything new in the general mode of gearing, or of employing springs and adjusting screws, these being common to machines used for the same, and for other purposes; but I confine my claim to the particulars above stated, with such variations thereof as will be substantially the same, producing a like effect by analogous means.

Improvement in the art of Smelting Iron Ores, and in certain Furnaces applicable thereto. By CHARLES SANDERSON, Great Britain. Feb. 9th.

CLAIM.—What I do claim, therefore, as constituting my invention, and desire to secure by letters patent, is the particular manner of constructing, and of operating with, the respective furnaces as herein described; that is to say, I claim the manner of constructing, arranging and combining the carbonizing chambers, fire-room, flues, charging and discharging openings, and arches, as represented in figures 1, 2, 3, and 3 *bis*, and described in the foregoing specification, in which the carbonizing chambers consist of close compartments, with charging openings at the top, furnished with close fitting stoppers, and otherwise formed

so as to adapt them to fuel which burns with flame, and operating in all respects substantially in the manner herein set forth.

I claim the manner of constructing and arranging the carbonizing furnace, in which anthracite, coke, or other flameless fuel is employed to heat the carbonizing chambers, said furnace being provided with a carbonizing chamber or chambers similar to those used under the first modification, and constructed substantially in the manner or on the principle represented in figures 4, 5, 6, 7, 8 and 9, and fully described in the references thereto.

I claim also the manner in which I have combined the operations of roasting the ore, and of carbonizing that which has been previously roasted, employing carbonizing chambers of the same kind as under the two preceding modifications, and otherwise arranging and operating with the respective parts, as represented in figures 10, 11, 12 and 13, and herein fully made known.

I likewise claim the manner of constructing, arranging and combining the respective parts of the furnace for reducing the prepared iron ore, as represented in figures 14 and 15, and herein fully described; said construction, combination and arrangement consisting in the manner in which I have combined the cupola, with the arch I, its bed B, for heating the ore; the provision for feeding the ore and fuel, and the manner of introducing the blast; by which construction and arrangement the slag and scoria alone are rendered perfectly fluid, and run away from the metallic part; said slag and scoria escaping over the dam-stone G, leaving the metallic part in the bottom of the furnace, in a state of pasty consistence, incapable of being run off as in the ordinary smelting furnace, and much better adapted to the purpose of being converted into bar iron. And this construction and arrangement I claim under the various modifications of which they are susceptible, whilst the same result is attained by means substantially the same.

Improvements in the method of constructing Locomotive Engines for Railroads. By HENRY WATERMAN, Hudson, N. Y. Feb. 10th.

CLAIM.—What I claim as my invention, and which I desire to secure by letters patent, is the particular mode of connecting the rear and front driving wheels by means of jointed rods placed at each end of said axle, so constructed as to enable the wheels to have a lateral and vertical motion, to enable them to accommodate themselves to the curvature of the track, and pass over whatever obstacles may intervene without danger to the engine. And in connecting the main boxes of the main driving axle to the base of the cylinder, or other convenient place, by jointed rods, so as to hold them firmly, and thus resist the strain on the axle and joints of the ordinary frame produced by the oscillating action of the pistons and their connections, and thereby to dispense with the usual frame and pedestals, which, with the boxes, are constantly liable to wear, from the causes before stated; and I claim the above mentioned improvements, whether they are effected in the manner herein set forth, or in any other mode substantially the same, and the last named improvement to be applied also to engines having but one pair of driving wheels.

Improvements in the manner of constructing the "Action" part of Piano Fortes. By TIMOTHY GILBERT, Boston, Mass. Feb. 10th.

CLAIM.—Having thus described my improvements, I shall claim the above arrangement of the parts of the action by which the spring M, after the strings are struck by the hammers, performs the three operations, of throwing back the hammer and preventing its recoil, throwing forward the damper upon the strings, and depressing the rear end of the key lever, consequently raising the opposite or key end, the whole being constructed and operating substantially as herein above set forth.

I also claim the mode of adjusting the end or cloth *t* of the damper to the string, by means of a piece of wood or spring *m n* applied to the rear end of the key lever, and raised or lowered by a screw *o*, and also the mode of adjusting the height of the jack by a similar contrivance applied to the same end of this key lever; the whole being arranged substantially as above described.

Improvement in the manner of constructing the "Hammer Heads" used in Piano Fortes. By TIMOTHY GILBERT, assignee of EDWIN FORES, Boston, Mass. Feb. 10th.

CLAIM.—I claim forming the top of the hammer heads of piano fortes of cork, over which the soft buff or striking part of the head is to be stretched and confined in the usual manner; the whole being arranged substantially as herein above described and shown in the drawings.

Improvement in the method of constructing "Cocks for Hydrants" or other purposes, by producing a perpendicular lift of the Piston. By EBENEZER HUBBELL, assignee of JOSEPH MARTIN, Baltimore, Md. Feb. 10th.

CLAIM.—The invention claimed and desired to be secured by letters patent, consists in lifting the valve vertically, without any horizontal or grinding movement, on its seat, by means of the before described revolving screw cap and screw head piston rod, whether constructed and arranged precisely in the manner above described, or in any other mode substantially the same.

Improvements in the method of constructing Clocks. By AARON D. CRANE, Newark, N. J. Feb. 10th. [Antedated Dec. 22, 1840.]

CLAIM.—The invention claimed and desired to be secured by letters patent, is:—1. The rotary pendulum.—2. The rotary hammer in the striking part of a clock.—3. The connection between the striking and time part of a clock, by which the time part is driven; all as herein described, and for the purposes herein before set forth.

Improvement in the method of constructing a Weighing Apparatus. By CHRISTOPHER EDWARD DANPIER, Ware, England. Feb. 12th. [Antedated Jan. 14, 1840.

CLAIM.—I claim as my invention the application of a geometric scale, formed on the principle of the rules herein before given, to a circular plate or disc, such plate or disc acting at the same time as a bent lever, and an equipoised balance beam for weighing matter, in manner herein

before described, and as an index of the weight so ascertained, as shown by the figures in the drawings annexed. And I claim also as my invention the combination, in operation, of the aforesaid disc acting as a bent lever, and the simple lever or steelyard, as herein before described, for ascertaining the weight of substances applied thereto by means of graduated scales, as herein before mentioned, extending the operation of the disc acting as a bent lever to greater weights than marked upon the disc, by means of the simple lever or common steelyard.

Improvement in the manner of constructing the Corn Sheller. By NICHOLAS GOLDSBOROUGH, Easton, Md. Feb. 12th.

CLAIM.—What I claim as my invention, and wish to secure by letters patent, is the concave, consisting of revolving twisted fluted bars, and hung upon springs F and G, in combination with the toothed cylinder, for the purpose and in the manner above specified and described.

Improvement in the manner of constructing the Plough, by attaching the Mould Board and Sheath, or cast-iron Standard together by means of Rivets. By BENJAMIN F. JEWETT, Springfield, Illinois. Feb. 12th.

CLAIM.—What I claim as my invention, and which I desire to secure by letters patent, consists in the before described manner of fastening together the mould board and sheath.

Improvement in the manner of constructing Door and other Locks, denominated the Combined Snail Wheel Lock. By SOLOMON ANDREWS, Perth Amboy, N. J. Feb. 12th.

CLAIM.—What I claim therein as new, and desire to secure by letters patent, are the use and employment of said combined wheels, having in them openings similar to those herein described, which wheels are to be operated upon within the snail formed, or other springs, and carried round to different distances by projecting pieces on the bit of the key, until a notch or cavity on the periphery of each wheel is brought to coincide with those on the other wheels with which it is combined, so as to admit of the opening of the lock, in the manner or upon the principle above set forth. I will here remark, that such is the action of this lock, that there is not any friction or wearing of the key, or of the parts of the wheels with which it is brought into contact, as its office is merely to carry the wheels round.

Improvement in the mode of applying Water to Fire Engines, so as to render their operation more effective. By FRANKLIN RANSOM and UZZIAH WENMAN, New-York. Feb. 13th.

CLAIM.—What we claim as our invention, and wish to secure by letters patent, is the employing the pressure of a column of water, or the tendency of the hydraulic pressure on water at rest to assist in the working of fire-engines, by combining a hose or pipe, conducting said water with the receiving tubes of an engine or pump, operated by animal or mechanical power, the same being constructed substantially in the manner set forth.

Improvement in the manner of constructing the Stove. By CLARK H. ROBINSON, Uniontown, Pa. Feb. 13th.

CLAIM.—What I claim as my invention and improvement, is the before mentioned arrangement to give the flame, &c. any direction, forward or backwards round the oven by means of flues C, and dampers D and F^1 F^2 connected therewith, and the additional apparatus H, which is heated by the oven, and hearth for roasting coffee, and for using as a spit, as described.

Improvements in the manner of constructing the Press for Cotton, Hay, &c. By LEMUEL BOLLES, JEDEDIAH PRESCOTT, and W. A. BICKFORD, Memphis, Tenn. Feb. 13th.

CLAIM.—What we claim as our invention, and desire to secure by letters patent, is the mode herein described of compressing cotton and other substances by means of the joint levers A A, connected with the abutments T T, and the press blocks B B, and the combination of the rack and pinion D and E with tiller C, and connecting rods F, operating substantially in the manner herein described and set forth.

Improvement in Parlor Stoves. By JOHN and EVANS BACKUS, New-York. Feb. 18th.

CLAIM.—What we claim as our invention, and desire to have secured to us by letters patent, is the construction of the hollow base and the radiators.

Improvement in the method of constructing the Fire Engine. By ASA BARRETT, Baltimore, Md. Feb. 18th.

CLAIM.—I claim as my invention, and desire to secure by letters patent, the combination of the jet pipe as above described, with a compact universal joint pipe or duct, managed by a handle or lever, all constructed in the manner and for the purpose above specified.

Improvement in Machines for making Cotton Roping. By CHARLES DANFORTH, Paterson, N. J. Feb. 18th, 1841.

CLAIM.—What I claim as my invention consists in the following arrangement, viz: the turning of the cylinder A, which bears and drives the bobbins in a direction which makes the roping run on the bobbins at the point of contact or bearing between the bobbins and the said driving cylinder, the roping being made to pass between the condensing belt or through the conducting tube to said point of contact in the direction of a tangent to said driving cylinder, whereby the bobbins take the roving at such a distance from the nearer edge of the said belt or tube as to be within the length of the fibre, and thereby the roping is not liable to be strained after passing upon the bobbin as may be the case in machines which deliver the roping through guides to the top or sides of the bobbins, the guides in my machine being made to deliver the roping filament to the condensing belt and this being placed on a line with the top of the driving cylinder so as to deliver the roping as near as may be in the direction of a tangent, as aforesaid, all substantially as aforesaid.

Improvements in Machinery for Trimming Straw Braid. By HENRY H. ROBBINS, Middleborough, Mass. Feb. 18th.

CLAIM.—I shall claim as my invention, the combination of a revolving circular saw, with a riser, (so called) and a spring and guage, the whole being arranged and operating substantially as herein above described, for the purpose of separating the "long ends" from the braid; and I also claim separating the short ends from the braid, on the opposite side of the same, by means of a circular saw in combination with a small metallic roller, bed-knife and guage, the arrangement and operation being substantially as herein above specified.

Improvement in the method of constructing the Lacteal or Artificial Breast. By CHARLES M. WINSHIP, Roxbury, Mass. Feb. 18th.

CLAIM.—I shall claim as my invention, a nurse bottle, shaped and curved in its several parts, so as to be used at the breast, and formed with a neck and mouth, substantially as above described. And I also claim in combination with the above, an artificial nipple, composed of sponge and wash-leather, the whole forming what I denominate a lacteal or artificial breast, as above specified.

Improvement in the Press employed for filling War Rockets. By ALVAN C. GOELL, Washington, D. C. Feb. 18th.

CLAIM.—What I claim as constituting my invention in the above described press, and desire to secure by letters patent, is the manner of combining a system of weighted levers with a screw, by causing a piston or rod to extend through a tubular opening in said screw, the lower end of said piston or rod acting against a follower, rammer, or other device analogous thereto in character and use, and its upper end acting upon a system of compound levers, by which the actual amount of pressure may be ascertained and determined, substantially in the manner or upon the principle herein fully set forth. I also claim the manner of combining two or more moulds, to be alternately brought under the pressing screw and piston, by the revolution of the basis on which they are situated, so that those not under the press may be prepared for its action during the time of making pressure upon that which is in the proper situation.

Improvement in machines for Inking Type. By FREDERIC J. AUSTIN, New-York. Feb. 20th.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the peculiar mode of throwing the roller across the form by means of the lever F and connecting rod G, combined and attached to the crank H, on the shaft I, of the pulley J, said pulley being operated upon by the weight P.

Improvement in Mills for Grinding Grain. By EZEKIEL G. WARD, New-York. Feb. 20th.

CLAIM.—But what I do claim as my invention, and desire to secure by letters patent, is the manner in which the grinders are connected

with the case and shaft, so that they can be removed at pleasure, and without injury to any part of the mill; that is to say, I claim connecting the front grinder with the case by means of the steps fitting into notches in the mill case, in combination with the method of attaching the back grinder to the shaft by means of the flange on the shaft having notches into which it steps, projecting from the back of the grinder, the shaft passing through the two grinders by which they are centred, and the grinding being regulated by pressing the flange against the back grinder, all as herein described.

Improvement in Stump Extracters. By BELDEN B. MASON of Randolph, and MATHEW JOSLYN of Napoli, N. Y. Feb. 20th.

CLAIM.—What we claim as our invention, and as an improvement on such a machine, is the employment of the semi-spherical nut and socket in combination with the screw and chain by which the stump is griped, for the purpose and in the manner specified above.

Improvement in the Headblock of Sawmills, for sawing without stubshort, and Guaging the thickness of the stuff to be sawed. By JAMES KING, Sapling Grove, Va. Feb. 20th.

CLAIM.—What I do claim as my invention, and desire to secure by letters patent, is the peculiar manner in which I have constructed and combined the various parts; that is to say, I claim the sliding block C, provided with a slot through which the screw-bolt passes to fasten it to the headblock, in combination with the standard A, the space between the two being occupied by a wedge B, to determine the thickness of the board to be cut, all as before described.

Improvement in the manner of attaching the Bristles to the stock of Brushes for Whitewashing and such other purposes. By ROBERT B. LEWIS, Hallowell, Me. Feb. 23d.

CLAIM.—I shall claim as my invention as follows, viz. confining the bristles in a brush (more effectually than heretofore) by means of a double chamfered bar, (whose section would be elliptical, and on which the bristles are placed) in combination with the metallic band *e e*, which is formed of two parts, united by joints and pins, as described; the whole being arranged substantially in the manner and for the purposes above set forth.

Improvement in the manufacture of Ploughs. By DRAPER R. JOEL NOURSE and J. C. MASON, assignees of ELBRIDGE G. MATTHEWS, Worcester, Mass. Feb. 23d.

CLAIM.—Now what I claim as my invention, and for which I ask letters patent, is—

1. The arrangement of the landside guage and slides, mortise guage, heelblock, and movable upright and crosspiece, shown at Fig. 1, in their adaptation to the purposes before mentioned, as particularly set forth in the foregoing description and explanation.

2. The arrangement of the bed piece, tenon guage, and the platform with the saws, shown in Fig. 2, in their adaptation to the purpose of

presenting the end of the plough beam to the saws in such a manner as to give to the tenons and shoulder a proper twist, inclination and obliquity to suit ploughs of different size and number, in conformity with the mortise guage as above described.

3. The arrangement of the platform *a a a*, Fig. 3, of the carriage and blocks B B and C, in their adaptation to the purpose of presenting the plough beam to the cutters, for beveling the edges in a manner suitable to the size and number of the plough, as set forth in the foregoing description and explanation.

Improvement in the manner of Fastening Bedsteads. By HERMANN C. ERNST, Vandalia, Ill. Feb. 23d.

CLAIM.—What I claim as my invention, and desire to secure by letters patent, is the application of a casting nearly in the shape of an anchor, for the purpose of confining the rails and posts of bedsteads to each other.

Improvement in the manner of Fastening and Combining the Truss Frames of Bridges, &c. By JOHN PRICE and JAMES T. PHILLIPS, Golden Post Office, Md. Feb. 23d.

CLAIM.—What we claim as our invention, and desire to secure by letters patent, is the within described manner of fastening and combining together the truss frames of bridges or of other structures, by the insertion of timbers which constitute key pieces or cross ties, as herein fully set forth, so as to obviate the necessity of using pins, tree nails, screw bolts, or other analogous devices.

Improvement in the Latch of Door and other Locks. By ENOCH ROBINSON and WILLIAM HALL, Boston, Mass. March 3d.

CLAIM.—We claim as our invention, arranging the latch bolt with an additional spring, which shall operate the same on closing the door to which the lock is applied, independently of the spring which acts on the knob; the whole being constructed substantially as herein above set forth.

Improvement in Machines for hulling and cleaning Clover Seed. By WILLIAM C. GRIMES, York, Pa. March 3d.

CLAIM.—What I claim as new, and as my invention, and desire to secure by letters patent, is the mode of hulling clover or other seed under a pressure, produced by centrifugal force, after the manner and upon the principle herein before set forth; that is to say: the seed in the hull is passed through a hulling chamber, in which it first diverges from and then converges towards the centre; centrifugal force subjecting the seed and hull to a pressure less or greater, according to the velocity of the wheel, spheroid or runner, as it passes over or around the bilge or periphery of the same.

2. I claim the combination of the fan with the hulling wheel or ring, and operating after the manner or upon the principle before described.

3. I claim the mode of regulating or maintaining a nearly uniform current of air through the machine, by means of a valve or door, operating after the manner or upon the principle herein before set forth.

LIST OF ENGLISH PATENTS

GRANTED BETWEEN THE 30TH OF JANUARY AND THE 23D OF FEBRUARY.

Charles Schafhaeutl, of Swansea, doctor of medicine, Edward Oliver Manby, of Parliament-street, civil engineer, and John Manby of the same place, civil engineer, for improvements in the construction of puddling, balling and other sorts of reverberatory furnaces for the purpose of enabling anthracite stone coal or culm to be used therein as fuel. Jan. 30; six months.

James McLellan, of the city of Glasgow, manufacturer, for an improved combination of materials for umbrella and parasol cloth. Jan. 30; six months.

Ezra Jenks Coates, of Broad-street, Cheapside, merchant, for improvements in the forging of bolts, spikes and nails. (A communication.) Jan. 30; six months.

Henry Passe, of Great Portland-street, pianoforte manufacturer, for improvements in castors. Feb. 1; six months.

Charles Hood, of Earl-street, Blackfriars, iron merchant, for improvements in giving signals. Feb. 1; six months.

William Wilkinson Taylor, of Barrowfield-house, Westham, Essex, gentleman, for improvements in buffing apparatus for railway purposes. Feb. 1; six months.

Dominic Frick Albert, of Cadishead, Manchester, LL.D., for an improved or new combination of materials and processes in the manufacture of fuel. Feb. 1; six months.

Francis Sleddow, jun. of Preston, machine maker, for certain improvements in machinery or apparatus for roving, slubbing and spinning cotton and other fibrous substances. Feb. 2; six months.

William Ward Andrews, of Wolverhampton, ironmonger, for certain improved methods of raising and lowering windows and window blinds, and opening and shutting doors, which are also applicable to the raising and lowering of maps, curtains and other articles. Feb. 2; six months.

Thomas Young, of Queen-street, London, merchant,for improvements in furnaces or fire-places for the better consuming of fuel. Feb. 3; six months.

William Hancock, jun. of King-square, Middlesex, accountant, for an improved description of fabric suitable for making friction gloves, horse brushes, and other articles requiring rough surfaces. Feb. 3; six months.

Joseph Bunnett, of Deptford, engineer, for certain improvements in locomotive engines and carriages. Feb. 3; six months.

John Cartwright, of Loughborough, manufacturer, Henry Warner, of the same place, manufacturer, and Joseph Haywood, of the same place, framesmith, for improvements upon machinery commonly called stocking frames or framework knitting machinery. Feb. 4; six months.

Thomas Griffiths, of Birmingham, tin-plate worker, for certain improvements in such dish-covers as are made with iron covered with tin. Feb. 8; six months.

James Thorburn, of Manchester, mechanist, for certain improvements in machinery for producing knitted fabrics. Feb. 8; six months.

William Ryder, of Bolton, roller and spindle maker, for certain improved apparatus for forging, drawing, moulding or forming spindle rollers, bolts, and various other like articles in metal. Feb. 8; six months.

Thomas Fuller, of Salford, machine maker, for certain improvements in machinery or apparatus for combing or preparing wool or other fibrous substances. (Partly a communication.) Feb. 8; six months.

Elisha Oldham, of Crichlade, Wilts, railroad contractor, for certain improvements in the construction of turning tables to be used on railways. Feb. 8; six months.

Charles Green, of Birmingham, gold plater, for improvements in the manufacture of brass and copper tubes. Feb. 8; six months,

William Wigston, of Salford engineer, for a new apparatus for the purpose of conveying signals or telegraphic communications. Feb. 8; six months.

John Scott, of Great Bowden, Market Harbro, timber merchant, for improvements in constructing railways, and in propelling carriages thereon, which improvements are applicable to raising and lowering weights. Feb. 8; six months.

James Johnston, of Willow park, Greenock, esquire, for improvements in obtaining motive power. Feb. 8; six months.

William Henry Fox Talbot, of Lacock Abbey, Wilts, esquire, for improvements in obtaining pictures or representations of objects. Feb. 8; six months.

William Edward Newton, of Chancery-lane, Middlesex, mechanical draftsman, for improvements in obtaining a concentrated extract of hops, which the inventor denominates "Humuline." (A communication.) Feb. 15; six months.

Theophilus Smith, of Attleborough, Norfolk, farmer, for certain improvements in ploughs. Feb. 15; six months.

James Whitelaw and George Whitelaw, engineers, of Glasgow, for a new mode of propelling vessels through the water, with certain improvements on the steam engine when used in connection therewith, part of which improvements are applicable to other purposes. Feb. 15; six months.

Philip William Phillips, of Clarence-place, Bristol, gentleman, and William Bishop Peck, of Broad-street, Bristol, wine merchant, for improvements in four-wheeled carriages. Feb. 15; six months.

James Ransome and Charles May, of Ipswich, machine makers, for improvements in the manufacture of railway chairs, railway and other pins and bolts, and in wood fastenings and trenails. Feb. 15; six months.

William Scamp, of Charlton Terrace, Woolwich, surveyor, for an application of machinery to steam vessels for the removal of sand, mud, soil and other matters from the sea, rivers, docks, harbors and other bodies of water. Feb. 16; six months.

William Samuel Henson, of Allen-street, Lambeth, engineer, for certain improvements in steam-engines. Feb. 16; six months.

George Edward Noone, of Hampstead, engineer, for improvements in dry gas meters. Feb. 18; six months.

William Orme, of Stourbridge, ironmaster, for improvements in the manufacture of cofered spades and other cofered tools. Feb. 18; six months.

John Collard Drake, of Elm-tree-road, St. John's Wood, land surveyor, for improvements in scales used in drawing and laying down plans. Feb. 18; six months.

Anthony Bernhard von Rathen, of Kingston-upon-Hull, engineer, for certain improvements in fire grates and in parts connected therewith for furnaces for heating fluids. Feb. 22; six months.

William Newton, of Chancery-lane, Middlesex, civil engineer, for improvements in the process of and apparatus for purifying and disinfecting gravy and oily substances or matters, both animal and vegetable. (A communication.) Feb. 22; six months.

Thomas William Booker, of Melin Griffiths Works, near Cardiff, ironmaster, for improvements in the manufacture of iron. Feb. 22; six months.

Jonathan Guy Dashwood, of Ryde, Isle of Wight, plumber, for improvements in pumps. Feb. 22; six months.

Moses Poole, of Lincoln's Inn, Middlesex, gentleman, for improvements in tanning and dressing or currying skins. (A communication.) Feb. 22; six months.

John Dean, of Dover, chemist, for improvements in preparing skins and other animal substances for obtaining gelatine size and glue, and in preparing skins for tanning. Feb. 23; six months.

Charles Sneath, of Nottingham, lace manufacturer, for certain improvements in machinery for the making or manufacturing of stockings or other kinds of loop-work. Feb. 23; six months.

LIST OF IRISH PATENTS GRANTED FOR DECEMBER, 1840.

J. Gibson and Thomas Muir, for improvements in cleaning silk and other fibrous substances.

W. H. B. Webster, for improvements in preparing skins and other animal matters for the purposes of tanning and the manufacture of gelatine.

Thomas Oram, for improvements in the manufacture of fuel.

H. Waterton, for certain improvements in the manufacture of sal ammoniac.

Thomas Lawes, for certain improvements in the method and process and apparatus for cleansing and dressing feathers.

A. F. Campbell and C. White, for improvements in ploughs and certain other agricultural implements.

R. Stirling, for certain improvements in wire ropes, and in machinery for making such ropes, which ropes are applicable to various purposes.

Thomas Kerr, Esq. for a new and improved mortar or cement for building, also for moulding, castings, statuary, tiles, pottery, imitations of hard and soft rocks, and other useful purposes, and which mortar or cement is applicable as a manure for promoting vegetation and destroying noxious insects.

John Condie, for improvements in applying springs to locomotive and railway, and other carriages.